THE

UNITED SERVICE.

No. III.—July 1879.

OUR CAVALRY.

Our cavalry is in danger. It has enemies of its own household (of its sabre): enemies among its "familiar friends," some of whom need well look to it that their own famous weapon be not turned into—a shovel. It looks *up* in vain for an intelligent friend. Some would throw away the sabre; some would give them long rifles; one would equip them as brigands, pure and simple, with rifle, pistol, and a bowie-knife. It has savage enemies, mounted and armed with fire-arms and with the lance, which, with its better rival, the sabre, has in all ages crested the waves of victories, and holds a place among civilized and savage to this day. But the Indian thus equipped rarely faces the "long knives," but retreats to the natural fortifications of his land,—lava-beds, etc., so strong and near,—and there, with the best fire-arms of long range, defies our best infantry. *There* the sabre is of little use, the horse of none. But the Indians are at desperate bay, as in a big "drive"; they are surrounded now, and see and feel the daily contraction of the ruthless bounds and their approaching fate.

Thus the sabre is temporarily greatly depreciated, and, by a curious coincidence, the cavalry has been burdened by tactics, the fatal defects of which are overlooked in this exceptional Indian warfare, but which would, eventually, deprive us not only of the sabre, but of this great force deemed essential in all modern armies.

The value of the sabre has never been fully tested in our service. One cause has been that it was nearly always supplemented by the carbine, and the choice in use of the two weapons has been with the latter—for it offered ever a tempting excuse, a passive choice against the energy of violent action and the shock of the charge.[1]

[1] A distinguished friend has told the writer an *a propos* anecdote. He was called from his office in Newmarket, Shenandoah Valley, in the summer of 1862, by

The other cause was that the sabre was seldom sharpened or kept sharp. As issued to the new troops, it is little better than a club.

An English officer, after his first combat in India, observed with astonishment among the slain by some allied native cavalry, many heads and limbs dissevered, and evidently by single strokes. He inquired into the secret of such execution, expecting to find sabres of fabulous Eastern excellence. But it was all done with condemned British sabres; the natives had sharpened them like razors, and to preserve the edge had changed the metallic for leather scabbards; they had also attached longer wooden handles.

It is said that the cases are rare of the actual crossing of sabres or of bayonets. But *the* argument, from sedentary sources, is that the medical records show few wounds inflicted by those weapons. Of all the wounds of our civil war that "have been analyzed and recorded," only nine hundred and six have been inflicted by sabre cuts and bayonet stabs. But there is no record of the wounds of the slain; and thrusts or points are far more fatal than cuts (although the writer has known one to cleave in twain an Indian's head who had a rifle in hand).

It should be remembered, too, that cavalry are celebrated for making many prisoners—by the thousand at the battle of Winchester. They dominate disordered infantry; the sabre and its point is upon them, and who may flee from a horse!

If, in a charge or mêlée, one trooper, sabre in hand, meet another with pistol or carbine, the violent motion will, as a rule, cause the latter to miss his opponent whilst about to meet his sabre point; but if the shot be effective, in many cases to one it will not disable his adversary for an immediate thrust or cut. A man in a charge who encounters the point of a passive sabre will be deeply wounded. "My knife never snaps," said an old frontiersman. A dragoon expressed a similar idea,—"My sabre is always loaded."

But in truth the argument is decisive in *favor* of sabre and bayonet. All know that it is not a rare thing to make cavalry and infantry charges—is ever a victory without one? The reason that they are seldom fully encountered is that they are so fearful; one side generally gives way, shrinking from so imposing, so dreaded, an onset.

By the sabre and by the bayonet the bravest and best commanded troops gain nearly bloodless successes.

Cavalry never had just appreciation in our country. Its first introduction into the army after the old wars was a single regiment in 1833.

General J. P. Hatch, commanding the division cavalry, just returning from a reconnoissance, to "come out quick and see a beautiful sight." He hastened out, overflowing with vague conjectures, to be shown, in an ambulance, five friends and foes with bloody bandages on sabre wounds. "There," the general exclaimed, triumphantly, "that's what I have been trying to bring them to for the last three months."

Before 1861, it had not acquired the numerical importance to attract interest or to be well known by many officers of the army. A consequence was that at the beginning of the civil war our chief commanding generals were ignorant of its tactics, its management, and its value. They took up prejudices, too, which arose from the length of time ever necessary for its instruction and discipline; disappointed at its premature inefficiency, in the hands, too, of a multitude of inexperienced officers. But besides, the forests and other natural difficulties of the scenes of several campaigns gave excuse for continued indifference and ignorance. All this was a great damper to an arm requiring a peculiar talent, much experience, and a wise but stimulating appreciation. Added to all, it was trained, by a strange fatality, under two far differing systems of tactics!

The results were, with a few brilliant and suggestive exceptions, notably at Winchester under a very young but thoroughbred cavalry general,—that, exclusive of services, important, indeed, but of which actual fighting was not a prominent element, it became in battles and serious combats little better than a poor substitute for infantry.

The carbine became the arm on which it relied. When used on horseback it was especially inefficient. The cavalry was consequently generally dismounted for action.

This neutralized one-fourth, to hold and guard the horses.

Their carbines were inferior to the musket.

They were less mobile than infantry, unless with extraordinary risk of losing the horses.

The horses were sometimes lost.

They *cost* as much as the very best cavalry, which is much more than infantry.

The great improvement in fire-arms of the last thirty years, or thereabouts, has lessened the value of cavalry somewhat (of field artillery perhaps more), but not so much as some ignorant officers suppose. There was the same false alarm on the introduction of gunpowder.

There must remain a cavalry to carry by a destructive momentum cold steel into the hearts of masses, columns, lines, which the dire exigencies of war enable it to strike; to surprise in irregular charges of great velocity smoke-enveloped batteries,—a service often of capital importance; to push, to follow up, and give abiding value to victories.

The speed of a line of charging cavalry, the aggregate of life, motion, noise, and power gives a spiritual momentum to both rider and horse.[2] From clouds of dust and smoke, with cannon roar and a great shout, it comes! There is a rumbling thunder of hoof-strokes shaking the ground, and a lightning gleam of steel.

The nerves of many expectants must be shaken. Thus, if it carry

[2] "Thou hast clothed his neck with thunder. He rejoiceth in his strength, and goeth on to meet the armed men; neither turneth he back from the sword."—JOB.

home only fragments through random volleys, there shall be confusion to shield the line close following, and some gaps to let its torrent in.

We shall have such a cavalry, *or*, for a time, a hybrid force, begot of the new tactics; a sort of mounted infantry, best mounted on mules or ponies; it will be useful for a time against Indians; even in war, for scouting and some rare case of surprisal; but it will not pay; it will be too costly to use as infantry; and when war shall come we shall begin, as in 1833, to build slowly upon tradition, with no written system that can be used.

The writer is convinced that in many exigencies of war improved fire-arms play an unimportant part; that the battle of Rossbach would have been such a case. Soubise, with sixty thousand men,—seven thousand cavalry in front,—marched with a long sweep to reach the flank or rear of Frederick's twenty-two thousand men camped in order of battle. Frederick, who detected the design, marched at the proper time, with four thousand cavalry under Seidlitz in front, and covered by a broad hill, met and surprised his enemy marching,—took him in flank. Seidlitz had time to put himself in order, and then, without awaiting orders, charged upon the vast column of cavalry, only two or three regiments of which could manage to deploy; he "slashed through them" over and over again, and in not many minutes drove them on their infantry and from the field in hopeless flight. Then the Prussians—only seven battalions engaged, or visible to the enemy, and with twenty-two pieces of artillery—smote the disordered and undeployed column of infantry. But Seidlitz had rallied and got in good order in a hollow; until, observing the proper moment of the enemy's confusion, he charged upon their rear, and in twenty-five minutes drove in utter rout the fifty thousand infantry, taking five thousand prisoners, etc., etc. Those that escaped were fifty-five miles from the field of battle the second day!

The writer would arm a portion of our cavalry with carbines, but undoubtedly in such a battle as Rossbach they would prove a mere incumbrance.

The first step toward a permanent cavalry was taken in 1832, when eight companies of mounted rangers were legalized and raised. Their name and character were a concession to a prejudice, better founded then than now, in favor of Western frontier material for Indian fighting.

The following year, 1833, the regiment of dragoons replaced the rangers, and became a permanent army organization.

Its first year was passed under miserable, and indeed calamitous, conditions. Allowing for an inexperienced but profound ignorance in the War Department of the new arm, its treatment that year would serve as an extreme illustration of the "little wisdom" of *cavalry* government.

The folly was tragic; it deserves a monument of warning.

Good stables were built at Jefferson Barracks, Missouri, for the six troops first organized, and they occupied the fine quarters there, in the autumn. They were very busy with the first lessons of a new art, when, before all their horses had been received, without premonition, there came an edict for a march to Fort Gibson, Upper Arkansas. Before they were all clothed,—and some without instruction,—wretchedly armed, they were put upon horses, and started on a five-hundred-mile march in snow. Arrived in the last days of December, they found no quarters, stables, or forage; this last was not attainable. The mercury sank to —10°.

Emerging from a canebrake in the spring, they were joined in June by the other troops, and all, still without proper arms, marched, with the mercury at 105°, due southwest, with no particular object, unless in the mind (!) of the War Department, to flatter Congress that it could make a fiat cavalry that would circulate.

Whether from seeds of disease implanted by their wretched winter exposure or the terrible heats of the nearly waterless plains (which were persistently invaded, as if in defiance of nature, the only enemy), they lost that summer *one-fourth of their number*,—officers and men,—including the hair-brained brevet brigadier-general commanding, and his aid-de-camp.

Of the rise, progress, and *decline* of our systems of cavalry tactics I shall here give a sketch, with a criticism; if this last prove to be technical and dull, nevertheless it shall closely touch matters of much public interest.

At Fort Gibson there were in the regiment but two copies of some forgotten cavalry tactics. All the troop officers were drilled as privates by the major, who had a book; in afternoons these officers imparted to squads of the rank and file the instruction of the mornings.

The regiment was divided to two other posts, on the Missouri and Upper Mississippi, and in 1836 a second regiment was added to the army for southern service. Six years were passed with little tactical progress. Only the Seminole Indians of Florida were pushed to a war, in which, of all the army, the Second Dragoons alone was a constant factor. In the north there was a long lull of territorial encroachment; a very quiet and friendly supervision of the tribes was maintained by summer marches of the First Dragoons.

Three of its young officers had been sent to a cavalry school in France to observe and practice their system, and to make a translation of their tactics. It was made, and in February, 1841, it had been approved, printed, and published. It had been adopted in France in 1826, and was for that portion of their cavalry which was armed with carbines, pistols, and sabres (or with lances).

It was one of the old European systems, restricted of any elasticity

by formal conservatism. Much was sacrificed to a strict consideration of which flank of a force should happen to be in front; an inversion was an exigency which must receive special treatment, or must be avoided by manœuvres dangerous for cavalry, and with no other motive or excuse; such were the countermarch, and the formation of long lines by movements of one, two, or four files. Any change of face or formation, during which cavalry cannot make an attack, makes it helpless for so long; and its chief enemy, other cavalry, is watchful, prompt, and of great velocity of motion.

In that system the "open column" of platoons was used for regimental evolutions; their column of fours was, in consequence of double ranks, impracticable, and its depth was double the front in line.

It was the result of the old theories and formation, that in the tactics of 1841 were to be found such puzzling commands as, "On the rear of column—by inversion—into line faced to the rear."

Right or left in front then made a great difference of action and result; and a mistake of one troop, perhaps under fire, would produce general confusion.

In December of 1858 the colonel of the Second Dragoons was ordered by General Scott to revise this French system. At the beginning he was not opposed to cavalry formation in two ranks. After a time he became convinced that the single rank—called in the British army, "rank entire"—was far preferable. He burnt what he had written, and began again.

This formation has now reached so strong a footing that it is scarcely necessary to discuss it; as, however, the double-rank formation is still to be found in the tactics now prescribed, it may be well to touch briefly on some facts and arguments which condemn it.

It was found that single rank cleared the way in troop instruction of all the most difficult and puzzling movements, which probably doubled the time with beginners; that it could greatly simplify all manœuvres, even of brigade. Much seems to result from the fact that four troopers abreast practically cover a square of ground, and thus a column of fours becomes an "open column," has the depth of its front in line. It could be used in all evolutions, and, in connection with another logical improvement or two, would dispense with the most difficult and complex ones. It was considered, too, that these facts had greatly increased significance in view of the economical national policy of a very small standing army, and the consequent necessity of creating cavalry for war in a minimum of time. It used to be considered impossible to create good cavalry in time of a war of moderate duration, and, from evident causes, that grows less and less.

But above all he was convinced that the new formation made cavalry far more effective in war—in battle, probably, almost doubled each trooper's value.

It adapted itself to the rather modern theory, and practice, that cavalry should be disposed in many lines, and should depend upon striking repeated blows. Colonel Napier, the great military historian, thus sums his observations in the Peninsular War: "That cavalry that had the last reserve was victorious."

It was a change called for in view of improvements in artillery and small arms.

The Duke of Wellington favored the change, decidedly; he thought it would "render the use of cavalry much more general than it is at present." (1833.)

The single rank was *proved* very effective by the British Legion, in Spain (under Sir Hugh Evans); and in Portugal, 1833–34, under General Bacon.

Colonel Macdougall, superintendent of the British Royal Military College, in his "Theory of War" (1858), concludes by strongly recommending for "both light and heavy cavalry,

"The abolition of two ranks.

"The substitution of a good revolver pistol for the heavy, cumbrous, and useless carbine."

But a great obstacle was found to the success of the new system in the legal cavalry organization of ten troops. The Duke of Wellington considered this a matter of so much importance that he recommended the change of tactics in England to be suspended, to await action of Parliament for a suitable organization.

The colonel however persevered, and with limited experience then, elaborated a new system, embracing evolutions for brigade and division (the tactics of 1841 stopped with the regiment). He worked very quietly and unquestioned in Washington for eighteen months, with an interval of the summer of 1859, when he went to Italy to witness a campaign in the war of Sardinia and France against Austria.

In the spring of 1860 the Secretary of War deputed a distinguished officer to examine and report upon his work. He and the author together went over every word of it with careful scrutiny, making very few and slight changes; the report was favorable.

The following is extracted from its "Introduction": "Adopting, then, the single rank formation, my work of revision became one of construction; and I have freely chosen what I judged to be the best points in the systems of France, Russia, Prussia, Austria, and England. I have added to all. The work will be found to amplify the old range of movements, whilst its simplicity renders it less voluminous.

"In the decisive action of cavalry the rear rank, *under another name*, will be screened from much of the enemy's fire; will be reserved from the confusion which even success throws into the front rank; but that rank *defeated*, it not only escapes being involved, but is close at hand to profit by the impression which may have been made on the enemy."

But the author did not find favor with Secretary Floyd; he delayed final action, and assigned him to a distant command.

He was only able to return from this in October, 1861, and then he found the new work had been approved by the new administration, and it was printed and published with all form and sanction of the War Department.

The characteristics and improvements on the old European system were chiefly the following:

1. Single rank formation.
2. A very slight recognition of "inversions."
3. An habitual use of columns of fours.
4. A double column.
5. A great facility of oblique deployments.
6. Marches in line of troop columns of fours.
7. Dropping the use of the carbine.

The author, promoted, and placed in command of the cavalry of the Army of the Potomac, a few days after received a letter from the very powerful young general commanding that army, forbidding the change of tactics as dangerous "in the presence of the enemy"; and soon after he armed the cavalry with carbines. And, be it noted, that commanding a division, the new system, embracing instruction for its movements, thus gave place to that of 1841, which contained no tactics even for the brigade.

But the newly-adopted system had better fortune elsewhere, in spite of the increased difficulty of adaptation to the twelve-troop organization of volunteer cavalry. A lieutenant-colonel commanding a regiment of volunteers, wrote to the author: "In two months of bad weather in a Kentucky rainy winter, we were able to execute every evolution in your tactics at a gallop." The tactics of 1841 prescribed that the trooper "after one hundred and eighty lessons or days of instruction should be able to enter the school of the squadron."

Afterward, from stupidity or design, when books of cavalry tactics were called for, both systems were sent out indiscriminately from the store-room at Washington, where they were deposited. Then Mr. Stanton gave a *verbal* order to discontinue the printing and issuing of the new-adopted system.

But as late as 1872 the War Department furnished the Third Cavalry with the new work at the urgent request of its colonel, approved by the lieutenant-general, and the regiment was instructed accordingly.

After the war, General Upton wrote a new infantry tactics, founded on the innovations of the cavalry system of 1861.[3] Especially he

[3] An officer of engineers has told the writer that he was by the side of Cadet Upton when the author of that work was testing, experimentally, some of his new movements, drilling cadets with that view. At a rest Upton said to him, "Why won't all this do for infantry, too?"

adopted the use of fours, the chief similarity of the proper movements of the two arms, and only rendered possible by single rank in cavalry.

The Board of General Officers, which approved Upton's tactics, struck with the great improvements originating in the cavalry tactics of 1861, but probably ignorant of that fact, as of cavalry tactics generally, recommended the assimilation of the tactics of cavalry and artillery to Upton's for infantry.

Thence arose an unreasoning cry for assimilation, which has been carried, as a new fashion, to extremes.

In 1867 the writer, considering the possibilities of the new organization of the cavalry regiment changed to twelve troops, resolved to employ all his leisure in re-writing the system of 1861.

This large organization suggested the idea, which he thinks turned out happily, of forming the regiment habitually in two lines, and treating it in some degree as a brigade; and this was much favored by an extra number of field-officers.

(The national legislature may well bear in mind that a change of organization is no light thing: that it may render impracticable any existing system of tactics.)

The writer had then gained the advantage of experience on a large scale, and not writing under orders, felt relieved of the restraints of precedent and conservatism. Guided always by practical knowledge, he resolved to follow the suggestions of a deeper study to their logical and ultimate results.

To illustrate, he will explain the origin of the regimental and brigade double column of fours, perhaps the most important invention, which will enable him to credit with a share in it an old friend long on his staff, John Buford, a man of cavalry instincts. General B. was obeying, in the Army of the Potomac, the system of 1841, but having in mind the double column of platoons in that of 1861, marched regiments side by side, each in column of fours; he told the writer that the roads were wide enough (although too narrow for platoons), and that he found this formation in marches gave him great advantages,—great facility and rapidity to sudden deployments.

The writer found that this double column of fours had the happiest adaptation to single rank; and an especial one to the regimental formation in two lines.

In the new work, which shall be conveniently referred to as the MS., simple provision is made to allow all mention or thought of right or left in front, or of inversions to be discarded; and, of course, there are no formations of lines by increments less than a troop, or marching from one flank past the other.

There is instruction as to the application of movements,—a thorough system of mounted revolver target practice, the result of a win-

ter's practice in a mountain valley of Utah,—an especial study and instruction as to the methods and circumstances of all charges, and of rallying.

In July, 1868, a board of three cavalry colonels was ordered to revise or examine and report a cavalry system of tactics, "conformed as near as possible to the infantry system."

Several manuscripts were submitted, but the MS. of the writer was thoroughly studied. One member hesitated on the single rank; but they were about to adopt it unanimously,[4] when the Acting Secretary of War, professing the same doubts, defeated a system he had not read, by recommending the board to try to devise a *double* system. The board was dissolved perhaps six months later, and no report was published.

In August, 1869, a mixed board, with the late Acting Secretary of War, president, and only one cavalry member, was assembled to "practically test the systems of tactics heretofore adopted for the artillery, cavalry, and infantry arms of service, to reconcile all differences, to select the best forms of command, and of drum and bugle signals."

The MS. was sent to this board. Near a month after a member wrote to the writer, "I think I may safely say that your system, with few changes, and they perhaps only verbal, will be adopted for mounted troops." In January of the following year he wrote, "The changes have not been made in the matter of the text, but in the arrangement. I have fought against the change, and am sure the original arrangement will finally obtain. I can still say that yours are the *cavalry* tactics that will be adopted, with fewer changes than have been made in Upton's infantry tactics."

After more than a year the board reported in print.

But in cavalry the new arrangements remained unaltered; and the MS. plan, beginning with what the recruit, or volunteer, must first learn, and everything in orderly sequence, was altered to give first place to sixty-four pages of infantry tactics; and the duties of the "interior service,"—the care of horse, arms, camp duties, were relegated to an appendix.

[4] General Emery wrote the author: "I did say to you, and I am quite willing you should make any use of it you choose, 'that if single rank in cavalry was to be adopted, I considered your tactics unique.' You have greatly simplified words of command, etc."

General I. N. Palmer: "I think that your system, after it had been made either a double or single formation, was as near perfect as any we could have."

General J. D. Sturgis: "I consider your revised tactics as incomparably the best, and I would rejoice to see them adopted."

An assistant adjutant-general from the cavalry, and who had himself written on the subject, being recorder of the board, was even more warmly in favor of the MS. than either of the above members.

Thus much may be pardoned to strengthen the faith of the reader in a work which has not yet had the fortune to be printed.

The board *did* substantially adopt the MS. (without a word of credit); all its novelties,—single rank (presumably the ex-acting Secretary *now* approved it), regimental formation and evolutions in two lines, double columns of fours most used in regiment and brigade,—no *word* of right or left in front,—the formation by *troop* of all lines from columns of fours,—columns and double columns of attack; these changed in name to "divisions" and "double column of divisions" (to "reconcile"—the powers).

By some fatality the board spoiled some and added a few evolutions, so that the writer wrote an official criticism, and proved, by diagrams, that six regimental and two brigade evolutions involved impossibilities. This was referred to the inspector-general and an assistant, who reported the objections to be substantial. As the system was not published, the inference seemed irresistible to the innocent critic that it was disapproved. But no such thing; it will appear that it was approved a year or two after.

But the infantry system reported was less fortunate. It appears that about a year after, all the reports of the Schofield board were sent to Lieutenant-Colonel Upton, and he was informed that the "Secretary approved his system of infantry tactics substantially; . . . and the systems reported by the board for the artillery and cavalry are also by him approved, only modified so that all three may be in perfect harmony each with the other. . . . The responsibility will rest on you, and when you approach completion, please advise me fully of the state of the work, and I will endeavor to procure the order of the Secretary for its publication."

It is always difficult to express an awkward idea, or the idea of another plainly, or even in the best English (and this was again verified in the order adopting Upton's works). Let it be considered: a board of five officers selected from the generals and from the three arms had so far changed the infantry tactics that its report, if adopted, would put an end to an old copyright; but it is sent, without approval or disapproval, to the author of the old work, to be used for improving it by revision; and the tactics for cavalry and artillery, the former approved, or substantially adopted by a cavalry board, and that mixed board and even by the Secretary, are submitted to an infantry officer to be made over to fit his old infantry system, and not even to be read before an order was to be procured "for its publication!"

July 17, 1873, an order of approval was issued for "The revision of Upton's infantry tactics, by the author, and the tactics for artillery and cavalry [including the proceedings of the board, Major-General Schofield, president], assimilated to the tactics for infantry."

It would certainly weary past endurance any but professional readers to attempt to specify all the faults of this Upton cavalry tactics now in use. So there is great difficulty to decide where to begin and

where to make an end. As a cavalry commander who had tried to teach it, and also to use it against Indians, writes that this experience of it "has increased my contempt for it to a degree that leaves me with no patience to criticise it. How any set of men who pretend to know anything of either the English language, or of the principles of tactics, could be other than ashamed of such crude errors and exhibitions of ignorance as are shown wherever one looks into it, passes my comprehension. . . . The skirmish drill is as bad as possible, and this with us is vital."

The critic must then endeavor to select some salient points and as mere specimens.

It is well and just to make here a considerable quotation, as it involves several tests of the work, and is one of the few real "harmonies"; (and the writer here makes his acknowledgment for the convenience of numbered paragraphs, especially as the author makes no use of them for the benefit of himself or students.)

"School of the battalion, 783. Being in column of fours, right in front, and at a halt, to form close column of companies to the right, the major commands:

"1. *To the right, close column of companies.* 2. MARCH.

"(Pl. 8.) At the first command the captain of the first company commands: 1. *Forward.* 2. *Column right;* the other captains command: *Forward.*

"At the command *march,* the first company changes direction to the right; the captain, after advancing thirty yards in the new direction, halts and allows his company to march past him; and when his rear four approaches him, he commands: 1. *Fours left.* 2. MARCH. 3. *Company.* 4. HALT. 5. *Left.* 6. DRESS. 7. FRONT. The other companies move forward and successively change direction, so as to enter the column in rear of the first, and are formed in line and dressed to the left by the same commands and means as the first.

"784. To form *on the right,* the major commands:

"1. *On the right, close column of companies.* 2. MARCH.

"The first company executes the movement as prescribed for forming to the right; the other companies move forward and successively enter the column beyond the point where the first changed direction, form line to the left, and are dressed to the left as before.

"785. To form *to the left,* the major commands: 1. *To the left, close column of companies.* 2. MARCH.

"The first company changes direction to the left at the command *march,* and having cleared the flank of the column by thirty yards, forms in line to the left, and is dressed to the left. The other companies enter the column in front of the first and are formed in line to the left, and dressed to the left in a similar manner.

"786. To form *on the left,* the major commands: 1. *On the left, close column of companies.* 2. MARCH.

"The rear companies pass beyond and enter the column in rear of the first, each company, as before, being dressed to the left.

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"789. The battalion being in column of fours, left in front, the movements *to the left, to the right, on the left,* and *on the right* are executed the same as when right in front, except that the companies, after entering the column, form line to the right and are dressed to the right."

Which last means that the new column, which faced in two cases to the front, and in two to the rear, when right was in front, now with *left in* front, does the same, but in each case exactly reversed. (The plates misrepresent the formations, showing an *open* column.)

Now, 784 makes exactly the same formation as 783, some part of it in each case on the same ground; but it is more difficult to perform, and is open to the serious criticism of disabling every part formed from any action until the last formation—*by a flank march*—is completed.

It is observed that these commands give no indication as to right or left being in front after the execution, and that changes every time; nor the direction to which the new column shall face, but indicates a wrong one, for in all other like commands, "*on* the right," there results a change of face to the right.

Then comes in 789, which, with *left in front,* reverses all the above formations!

Essential differences in the movements depend upon a right hearing by cavalry in motion, probably in a high wind, the difference of *on* and *to;* making a regiment face or turn its back upon an enemy by no other indication! And these puzzling differences are to avoid inversions.

Now in the formation of this same column *right* (*or left*), *front into line,* the book ignores which flank may be in front, and in half the cases makes extreme inversions,—of fours in troop, and the left company to the right,—and all ignored.

Suppose this *done,* and the next change to be a march to the *right,* followed by a necessity for any one of the above movements. Will that column be "right" or "left" in front? Any uncertainties, mistakes, diverse decisions of this question, would lead to confusion or an extreme difference from the result required. What "system" is there in ignoring right and left in front in some manœuvres, and not in others? (It originated in copying the tactics of 1861 only in part.)

This is the preparation of a small "battalion" for regimental exercises; but in the regiment are found, in 957 and 958, only two of the eight movements mentioned or hinted at; no word of right or left in front! Then, how shall the majors decide as to the meaning of the colonel? How shall they use their painful studies and practice of those phenomenal puzzles, which have bewildered and taken up so much of the time of the volunteer battalions? There is no explanation; confusion would result.

With a view to "perfect harmony," and to make the cavalry and infantry "as near alike as possible," this work introduces into company and into regimental exercises the formation of the company in double columns of fours, and also *two* double columns in a troop, which *are not* in the infantry; but not content with useless work, it disposes the regiment into lines of these columns, and with *closed intervals*. Such formations can only be intended for the field of battle; but to give effective force to cavalry, the closed intervals make necessary to a deployment preliminary and dangerous long flank marches.

Contrast the vagueness and even misleading nature of the commands in paragraphs 783–9 with one in the next paragraph, 790: to reform in column of fours, the major commands, 1. *Column of fours.* 2. *First company.* 3. *Right forward.* 4. *Fours right.* 5. MARCH. If he should command, 1. *Column of fours, right forward.* 2. MARCH, he would escape exhaustion of his voice and the futile transfer of the instruction of his "first captain" from the recitation-room to the noisy and troubled field of action.

In paragraph 717, the battalion in line, the major commands, 1. *Fours right-about.* 2. MARCH. 3. *Guide right;* and the line is supposed, instinctively, to march to the rear. Now, in 718, he commands to a motionless line, 1. *Continue the march.* 2. *Platoons right-about.* 3. MARCH. 4. *Forward.* 5. MARCH. 6. *Guide centre.*

These commands contrast as if they belonged to different systems, and one is short to uncertainty, the other prolix to repetition. But as to "perfect harmony," the last movement is not found in the MS., nor in Schofield proceedings, nor in the infantry tactics; exactly the same can be said of "by right of platoons rear into column" (507), which in addition is *impracticable* (pardonable ignorance for an infantry author?). But in this last, "dressing" of platoons is introduced—"to be as near alike as possible"—in "harmony" with the staid and methodical slowness of infantry, but never heard or read of before by any cavalry officer. And the platoon itself, which first and last enormously swells the amount to be learned by volunteers, is *useless*, is not found in the MS., nor in the Schofield board proceedings (only in the old 1841 tactics, where the column of fours of a different nature could be little used, and where the squadron consisted of two troops); and which has mention but in a single paragraph of the infantry battalion as a possibility.

Cavalry *is* made "near alike" in two evolutions, which, however they may possibly suit infantry, are as dangerous to cavalry, useless, and absurd. The first is the breaking a regiment of eight hundred or a thousand yards front, to march by fours from one flank close in front of the other; the object could be attained in ten seconds by "Fours, right or left, march."

The other, 905, "on right into line" for the formation of a line of

equal extent by fours! Should a regiment of cavalry or *infantry* attempt this formation,—and there is no other way laid down,—on arriving in an opening, to oppose cavalry, a single enemy's troop could easily sweep away all the first fours—facing in two directions—and most likely the whole regiment in flank march behind them.

The author assimilates infantry to cavalry, by forming a "double column" of infantry, pages 221–24, in the same manner of Schofield proceedings (following the column of attack of the MS.); this, notwithstanding he has the same formation, made in a different manner, under the name of "column of divisions."

If any one decidedly worst feature and vital fault of Upton's cavalry tactics could be selected, it would probably be its omission of this formation,—and the "double column of divisions,"—properly of "attack," this name truly indicating their essential character; this palpable result of ignorance is enough for any cavalry mind to condemn the work. As to assimilation, "harmony," it is simply its opposite; it steals a cavalry jewel, leaving it poor indeed!

The marches and evolutions of double columns of fours, for regiment and brigade—perhaps the happiest of late improvements—are harmonized out of the Schofield board's proceedings.

The work omits orders of battle, formations for and methods of attack, which is the sum of all cavalry action!—the passage of lines, collections or summaries of general rules and of definitions; rallies,—merely alluded to; pistol target practice, save five lines; picketing of horses in camp (campaign). The writer, after twenty years' study and experiment of this last, and observations in an European campaign, gave the concise result in the MS., and it was copied in the Schofield board proceedings.

No exercises for brigade, or only seven pages (there are seventy-two for the infantry); it takes up the brigade in a column of fours, say three thousand yards deep, and keeps that as the basis of supposed evolutions, without any commands, through five of the pages; one evolution is the formation by fours of a single line about a mile and a half long, which, at a walk, would consume half an hour. No sane cavalry commander ever conceived in idea such a monstrosity.

The importance which this new tactics attaches to the different subjects of instruction must be pretty well indicated by the spaces severally allotted, thus:

To dismounted instruction is allotted	132 pages.
About platoons, and company double columns of fours (useless)	64 "
The charge, in battalion	1 page.
The regimental charge	2 lines.
Pistol target practice	5 "
Evolutions of brigade	7 pages.
Ceremonies	48 "
Seventy-five cavalry trumpet signals, with music	30 "

With the confusion of seventy-five musical signals, the average soldier would not learn above a dozen in a year.

Colonel Upton was instructed to make the infantry "school of the soldier" identically the same for the three arms.(!) Unable quite to do this, he has, *en revanche*, given the cavalry the task of the "school of the company" with some formations *added;* this, and a division into four, instead of two platoons, in despite of harmony even for troopers afoot.

Then follows the "battalion dismounted" in vague and careless shape; but not failing to include "columns in mass," echelons, single and double rank.(!)

After the instruction of the cavalry man in the company and battalion drills in two ranks, we find that the regiment, dismounted to "fight on foot," forms in single rank. Contrary to precedent and convenience, skirmishing is first taught on horseback.

What dismounted movements were ever made in the war by the cavalry other than the advancing, retiring, and the flank marches of lines? (They *were* very apt at charging.)

Shall cavalry volunteers in time of war be set to acquire the exactitude of drill,—the peculiar formations of infantry essential to *their* part,—a sturdy resistance of all sorts of attack?

Let the first one hundred and thirty-two pages of this tactics for cavalry answer! Then follows for these recruits the tedious and severe work of practice and instruction relating to the horse and cavalry tactics generally; these alone requiring more time than they have ever been allowed by our impatient policies and exigencies.

This preliminary instruction in infantry tactics, with differences, and great additions to what cavalry would ever be called on to perform (in excess and exaggeration, it is thought, of the author's instructions), the eightfold puzzles which have been quoted, and a few other movements, which have been described or mentioned as *impracticable* for cavalry and useless and dangerous to either arm, constitute the important results of assimilation and harmony. (The changes of names are childish, but mischievous too, as childish things are apt to be.)

And these valuable gains have somehow been complemented by others extraneous, to wit: the addition to the work of the cavalry, which always requires much the most time for instruction, the preliminary study and practice of another arm, including some differences and defects which the trooper will have to "unlearn." Also the almost doubled work of two cavalry systems,—single and two-rank formations, —besides the single and double rank of the trooper's infantry education.

And not least, a work which in substance and tone must change and depress not only valuable action, but the spirit, style, and dash peculiar and important to this arm, as the cavalry eye [which has been much emphasized in print, indicating that the commander's eye must be very

sharp and quick to harmonize with the style of movement required of cavalry].

The legend of finest Greek imagination is far outdone by the modern Procrustes, who would torture to its death free-riding cavalry by repression to the infantry scale.

What was meant by the first order for assimilation should sensibly have been assumed to be that in revisions of tactics for all arms, late inventions and improvements should be well considered, and in how far applicable, as principles, to such arms. Such as the ignoring of inversions, the adoption of the columns of fours, single and doubled, for both cavalry and infantry; agreeing upon the same signals in their nature applicable to all troops. Beyond such as these it has been a blunder and a pretence.

These desirable objects would have been attained by intelligent and experienced efforts to make the tactics of each arm the best possible for that arm.

The material constitution, the formation and duties of the three arms are different even to contrast; their methods, motions, and arms are as "nearly *un*like as possible"; and "tactics" means the representative and orderly development of these differences. Consider only that the cavalry regiment has in this work three "battalions," and the infantry only one.

The attack and defense of infantry are mainly the same—by the far-reaching fire of small arms; even the superior force uses the protection of breastworks. Cavalry can scarcely defend itself, but must attack with weapons only available in contact. Artillery is passive, as the rule; only aggressive at a distance; it is defenseless, and always guarded by the other arms.

The attempt, as Colonel Upton was instructed, "To make a system of general tactics for the three principal arms of service, as near alike as possible," for these very opposites in spaces covered, in speed, and work to be done, could only result in the failure that we have seen.

The cavalry is always a force apart, under its own general. No word of command is ever applied to more than one arm. Cavalry is not put in line with infantry; is reserved generally; is at flanks or at the rear—detached, if not technically so. It properly is authorized to act without superior orders; watches the opposite cavalry; waits for the *moment* of opportunity to charge a half-beaten infantry; it finishes things in its own way. It is apt to be in front on the advance, behind in the retreat. It seldom marches even by the same road as the infantry.

Witness the "March to the Sea" (the longest strategic march, or succession of marches of record, and the ablest!). There the cavalry column was generally far on a flank, enemy-ward; sometimes two marches off. *There* was "harmony,"—the real and only harmony of combinations inspired by a genius for war.

And is there truly "nothing new under the sun"? Are there cycles of delusions?

The writer witnessed an honest, logical attempt at assimilation. It was in the old times, after the regiment of dragoons had emerged from its cane-brake hibernation; so soon as it had received some instruction, and the horses had revived a little on prairie grass, the infantry colonel commanding—brigadier by a brevet, which, then a distinction, seemed to have unsettled him—essayed to command in a brigade drill. The dragoon regiment was paraded in a line extended to the left by the Seventh Regiment of Infantry. The general commanded a change of front to the right; the cavalry trotted off, pivoting on their right flank, and very soon had finished. After a time an interest was felt in the infantry regiment, and it was gratified by a distant view of it, marching leisurely through the hot prairie,—a column of route. As that seemed the only kind of evolution capable of any assimilation, the general bethought him of firing; he commanded the long line to *commence firing;* then the cavalry officers in front of the line began to think it an awkward matter,—not exactly "the thing,"—it was funny but warm. However, they stood fire, as did the front rank that of the second, ten feet behind.

And this "Tactics for Cavalry,—including the Proceedings of the Board, General Schofield, President,—assimilated to the Tactics for Infantry," is solely upheld by one who professes "no knowledge, or skill in that branch."

SOMETHING ABOUT DEEP-SEA SOUNDING.

II.

We have followed Sir William Thomson in his interesting detail of the first experiment made with his machine and piano-wire in the Bay of Biscay, June 29, 1872; now, for a moment, let us turn back the pages of this retrospect and read an extract from another of Brooke's journals, just furnished the writer, "which records," as Brooke says, "the speculations in which he indulged as the first successful cast made by him was in process of accomplishment, and of which one can readily imagine the intense expectation."

Brooke was then an acting lieutenant on board U. S. S. "Vincennes," flag-ship of the Ringgold and Rodgers exploring expedition, and the trial was made January 31, 1854, in the South Pacific, latitude 12° 59′ S.; longitude 162° 58′ E.

He says, "This day witnessed the successful operation of my contrivance to procure specimens of bottom from considerable depths. At two thousand one hundred and fifty fathoms the apparatus struck bottom, the shot, or leaden weight, was disengaged, and the rod, or piston, came freely up, bringing with it abundant evidence of bottom.

"While hauling in the line I pictured to myself the appearance which would probably be presented by the rod. I thought that perhaps there would be merely an imprint; then that a fragment of coral or a shell would adhere. I speculated upon the proof required, and when at last I recovered the rod I could scarcely realize its appearance.

"Adhering to it was a coating of calcareous mud of great tenacity; the arming was covered, and even the marks made by the leaden shot in slipping off remained.

"The oxide of iron had discolored, or, rather, colored, the coating, while that portion of the rod *exposed* continued bright. The chemist supposed that the oxide was from the bottom; but, at my suggestion, he made an artificial compound of lime and clay, and covered a portion of bright steel with it, submitting it to the action of sea-water, and in a few hours it was colored very deeply, its original faint color turning to a deep orange-red.

"The line was of fifteen-thread sounding-twine, .07 inch in diame-

ter" (the same size, be it remarked, subsequently used on board the "Cooper"), "and had been on the reel since leaving Norfolk, having been marked on the outward passage to Madeira. The shot weighed about forty pounds.

"The apparatus was put over from a boat at 10h. 11m.; reached bottom at 11h. 07m., its velocity diminishing very regularly. I took it in hand myself and started it fairly on the way up; then one hand on the reel wound away.

"A quartermaster or myself kept hand constantly on the line to see that no undue strain was brought upon it.

"In veering, the line was nearly, or, rather, exactly, up and down; there was barely any swell; the air came in faintest cat-paws; the temperature was very high, and we were all well burned by the nearly vertical sun. I spread the awning, however, and kept some of it off. In hauling up, there was a barely perceptible motion of the boat, first to N.E., then to N.N.W., indicating a very slight surface current to the southward, and an under current to the northward.

"At 1h. 45m. P.M., the sounding was finished, and, exceedingly well pleased, I returned to the ship. Mr. Stimpson, the naturalist, proposes to name the shells after me; they are *foraminifers*, and have never been before found at such a depth."

Since the publication of the first part of this paper, Rear-Admiral William Rogers Taylor, U.S.N., in a communication to the *Army and Navy Journal*, concerning the statement, made on the authority of Lieutenant-Commander Jewell, that it was at Maury's suggestion the method of time intervals was tried and adopted on board the "Albany," says, "I have always thought the original idea my own. It was suggested by observing the regular decrease of velocity in the descending weight used in sounding, which I thought might prove of value if a careful note should be made of the time at which the mark for each hundred fathoms passed through the hand. I mentioned this idea in my letters to Lieutenant Maury, but have no recollection of any reply. My correspondence with him on the subject of soundings was perfectly informal, there being no idea on my part that any portion of it would ever be published. I do not remember any conversation with him about the soundings until after my return from the cruise in the 'Albany.' I only know that there were no instructions except general ones; all the details were left to me. . . . The first line of soundings across the Gulf of Mexico of which I have any knowledge was made by the 'Albany,' and from that ship were made the first soundings through the Florida Channel."

This is welcome and important information, and the writer is glad to accord his valued friend, Admiral Taylor, the credit of the inception of the first successful step towards getting accurately at the depths; the idea of noting the rate and intervals of descent of the line, deducing

therefrom the law which signaled with considerable accuracy the arrival of the lead on the bottom,—the method taken up by Lee and Berryman, perfected by Spratt and Brooke, and used by the "Challenger" in all her work, as well as by many other vessels, European and American, following the lead of the "Albany."

The "Tuscarora" arrived at San Francisco, and proceeded thence to the Mare Island yard, some thirty miles up the bay, the latter part of June, 1873, where she found orders concerning her equipment awaiting her. The orders were so liberal and comprehensive that any officer failing to do what was expected of him would have been obliged to show the most unblushing effrontery to have excused himself; indeed, it was jocularly said "that the commanding officer might carry off the whole yard if he felt so disposed!" Yet, with these facilities, if there were any officers thereabout anxious to volunteer for such work they were not readily discoverable. It was equally fortunate for the ship, too, that the commandant, Rear-Admiral John Rodgers, who had seen much hard surveying service, including deep-sea work already mentioned, gave his hearty and active sympathy and invaluable information and suggestion with regard to the fittings of the ship and the objects of the expedition.

The guns and ammunition were landed to make room for sounding-lines and apparatus and extra coal, and a working room was put up on the quarter-deck over the space left clear by the removal of the pivot-gun. The fittings transferred from the "Juniata," including more than forty miles' length of rope, made a formidable-looking pile before being stowed away, and the modest little Thomson machine, in its snug iron tub, and 180-pounds package of wire, seemed absurd and looked like a joke. The machine simply consisted of a hollow drum of thin galvanized iron, a fathom in circumference, and three inches wide, revolving on an iron shaft passing through its centre. The disks forming the sides were enough larger than the drum to form rims, like the rim of a car-wheel, two or more inches deep, and a third rim projected from one side forming a V-groove. On one side of the shaft a ratchet-wheel was fitted to receive a pawl, and the other had a wormed brass wheel by which its motion was communicated to the cog-wheels of a counter, having three dials to register the revolutions. The shaft, fitted at each end for cranks, revolved on two metal standards bolted to a stout oak plank three and a half feet in length and fifteen inches in width. The weight of the drum, including the shaft, was hardly more than sixty pounds. The dynamometer-wheel, revolving in an iron crotch, was placed directly in rear of and close to the drum, and in a line with the V-groove. It had one groove in its rim wide enough to take two parts of rope, and another much narrower to receive a cord. The dynamometer was simply a spring balance with graduated scale and index hand, fastened to the bed of the machine, and connected with the

dynamometer-wheel by a cord which lay in the narrow groove of its rim, and, passing down through a hole in the wheel, was made fast to the rod attached to the springs of the dynamometer. Now any strain brought to bear on the dynamometer-wheel to make it turn would be indicated on the scale by the pointer.

When making the machine ready for use, an endless rope of the proper size—nine-thread albacore line was used on board the "Tuscarora"—is placed in the V-groove of the drum or wheel, and the lower part from the bottom of the groove is taken up over the dynamometer-wheel and passed once round it in the wide groove: the other part, or bight of the rope, is placed over a grooved iron pulley-wheel and kept taut by means of a pendant run through a stationary block, the lower part of the pendant having a number of hooks from which to suspend weights of sufficient sizes as required.

The machine as received was fitted with a tackle to tauten the endless rope; the pendants and weights were substituted after the first trial of the apparatus at sea. It will be understood that the endless rope runs freely round the V-groove as the drum turns, but, being kept taut, the friction of the line restrains the action of the drum, and, passing round the dynamometer-wheel, communicates the amount of tension on the wire to the dynamometer, which is at once shown on the scale by the movements of the pointer.

The manilla-rope sounding-lines furnished the vessel were of sizes varying from one and a quarter inches to two and a half inches in circumference, and carbolized for their better preservation; and a heavy steam-reel and dynamometer, the invention of Passed Assistant Engineer T. W. Rae, U.S.N., was fitted on the top-gallant forecastle for use with this rope. This machine was ingeniously constructed, and though it did not work well at first, was gradually being improved and coming into favor, when the superiority of the Thomson machine became so manifest that the use of rope and its apparatus was abandoned altogether, wherefore no detailed description of its mechanism will be made.

The "Challenger" had put to sea in December, 1872, and everything reported of her movements and work was scanned with great interest. Among other things it appeared that her sounding-lines were made of carefully selected Italian hemp and the No. 1 size—the size principally used—was only eight-tenths of an inch in circumference, with breaking-strain of twelve hundred pounds. This, coupled with the fact of the use of very heavy sinkers,—four hundred pounds weight in deep casts,—was a great advance in the direction of easy working and accuracy in deep-water sounding from a ship's deck, but not comparable with the facility and perfectness of the action of wire only 0.028 inch in diameter, or considerably smaller in size than the wire used for ladies' hair-pins. The wire, however, was as yet untried on an extended scale, and as the smallest rope furnished the "Tuscarora" was about double the size of

the "Challenger's," the writer had some ten thousand fathoms of nine-thread albacore line made at San Francisco. This made a line about the size of that used in the English expedition, and it soon proved its superiority over the larger rope in the few soundings made with the heavy dynamometer on the forecastle.

Sir William Thomson's idea had been to haul back a 30-pound lead with valve-cup for specimen; but this seemed to impose extra labor, besides bringing an unnecessary strain on the drum of the machine, as well as on the wire; and, in fact, was not in consonance with the other features of his apparatus nor the ideas of deep-sea work at this stage. Sir William subsequently adopted the use of detachable sinkers. A lot of Brooke rods, received from the "Juniata," adapted for 32-pounder shot for sinkers, were fitted with a modification of the Sands cup, but their stems were so slight they often broke off in use, and the specimen brought up was small; it was, therefore, necessary to cast about for something better. The rod itself, when properly constructed, seemed to be the best detacher yet devised,—simple, easily made, and as sure in its working, when properly handled, as anything made by man can be. There was no need to go outside our own service for any other device; the only thing needed was an improvement looking towards the bringing up of a larger specimen, and to go with heavier sinker.

After much experiment both at sea and in port, three different metallic cylinders or cups, two and a quarter inches in diameter, were devised to go with 8-inch shot bored through to receive them, which answered the purpose satisfactorily, the No. 2, as was expected, proving to be the best for all characters of bottom. The weight of the bored shot was fifty-five pounds.

New rods were made and forged as lightly as possible consistent with strength, so that the weight to haul back would be no greater than absolutely necessary, the advantage of which precaution was readily seen when working in depths of three thousand fathoms and four thousand fathoms and upwards.

A trial was made with the English Fitzgerald machine, as a matter of curiosity, but one or two attempts were sufficient to prove the great superiority of the Brooke apparatus.

The equipment of the ship was completed about the 10th August, and on the 12th of that month, in accordance with the thoughtful orders of the Chief of Bureau, Commodore Ammen, proceeded outside the Heads of San Francisco to test the apparatus and appliances and familiarize the officers and crew with their working. After a preliminary sounding in shoal water three consecutive casts were made in eight hundred and thirty fathoms, one thousand and fifteen fathoms, and eleven hundred and ninety-five fathoms respectively, using the Thomson machine and wire and Brooke rod and sinker, the apparatus working beautifully. Then a trial was had with the heavy dynamometer

and 1¼-inch carbolized line and 11-inch shot for sinker, which resulted in failure; no directions had been sent with regard to the setting up of the machine, and some of its parts were not in proper place, wherefore the apparatus worked badly, and finally the line broke when nine hundred fathoms had run out. Work was then resumed with the wire, and a specimen brought up from thirteen hundred and sixty-one fathoms. The next cast resulted disastrously; upon reeling in from two thousand three hundred fathoms the wire was found to be broken about seven fathoms from the cod-line intervening between it and the sinker; not strain enough had been put on the endless rope or friction-line, and the wire had run down over the lead after bottom was reached and kinked and broke. This at once suggested weights instead of tackle for the tautening off the friction-line. A successful cast was now made in nineteen hundred and forty-nine fathoms, or more than two miles in depth, occupying one hour and forty minutes, which at the time was considered as quick work, particularly as the wire was hauled back hand over hand, by means of the hempen endless rope, and the men were obliged to spell one another frequently to prevent their hands from blistering.

But notwithstanding the fact that the sinkers had been left on the bottom, the reel began to show signs of weakness, as it had done in the Bay of Biscay, even with no weight to reel in save the wire, rod and cup; and a cast made without getting bottom at eighteen hundred and twenty fathoms, where a 32-pound shot was hauled back, made the stress still more apparent, and the drum began to assume the appearance of a battered old hat. The ship now, after an absence of two days, ran back to the navy-yard, and attention was immediately given towards the remedying of defects and the improvement of appliances. The experience already gained was invaluable, and laid the foundation of future success.

Meanwhile, Sir William Thomson was experimenting with his machine, endeavoring to correct faults of construction and improve its working so that it would stand without question any demand made upon it. His idea was to retain the original lightness of the drum and keep down its inertia, and he devised an auxiliary pulley fixed to the bed of the machine, with a castor-pulley in front to receive the wire from outboard as a fair-leader in coming in. Cranks were fitted to the auxiliary pulley as well as to the drum, and either two or four men could work them. By this means, with the wire passing over a quarter circumference of the castor-pulley,—which, as its name implies, could turn any way like a cabinet castor,—and three-quarters or once and three-quarters round the auxiliary pulley, the drum was relieved from two-thirds to nine-tenths of the strain originally imposed upon it.

He also did away with the dynamometer and its wheel which had been fitted to the machine furnished the "Tuscarora," and went back to

the simple friction-brake, such as he had used in the Bay of Biscay, but now controlled by weights, which could be put off and on at pleasure as the depth required, always bearing in mind that the resistance so applied should exceed the weight of the wire out by about ten pounds.

The method pursued on board the "Tuscarora" was in the direction of preserving the features of the simple reel and dynamometer as closely as possible. The experimental cruise, and all subsequent experience, demonstrated the fact that the weight of the drum could be increased to two hundred and fifty pounds, if necessary, without affecting the sensitiveness of its indications, and there was no time to dream and ponder over radical changes; the work was laid out, and seasons would not wait; it was expected that the survey would proceed with the means already in hand, and as it was seen that wire was infinitely superior to rope for the purpose in question, every effort was bent towards strengthening the original drum. The battered drum was restored to its pristine form and strengthened, and a new one constructed of heavier iron, and with wider face, to give more room for the wire.

The original reel would hardly hold more than three thousand five hundred fathoms of wire, while the new one was made to carry something over five thousand fathoms, or six miles. The V-groove was also deepened, and the wide groove in dynamometer-wheel widened, to lessen the possibility of the endless rope flying out in rapid working. The specimen cylinders were also improved, and such changes made in the arrangements of the heavy dynamometer as the trial at sea had seemed to make imperative.

Some two weeks were occupied in these final preparations, when the ship put to sea to begin the work assigned her, of running a line of soundings from Cape Flattery to Yokohama, Japan, *via* the Aleutian Islands; but the season was so far advanced that the orders were largely discretionary, and it was not expected the survey in those high latitudes could be completed that year,—1873.

After a reconnoissance in the waters about Puget Sound for a suitable place to land a cable, and the replenishing of the coal bunkers, the ship took departure from Cape Flattery on the morning of the 17th September, 1873, and began sounding. Lieutenant-Commander Jewell was assigned charge of the heavy reel for rope on the forecastle, and an extra wire apparatus for taking serial temperatures; Lieutenant G. A. Norris was given the management of the Thomson machine, operated in the gangway. Selected petty officers were detailed as assistants, so that the machines were always attended by the same persons, who, gaining experience all the while, soon came to know how to meet every phase of difficulty attendant upon the ever-varying conditions at sea. In this arrangement, due heed was given the value of "personal equation"; for, simple as is the working of the wire machine, great care and attention to details is necessary, and the apparatus needs to be managed

as deftly and carefully as a sextant or chronometer to make sure of good results.

It was intended to make alternate soundings with the rope and the wire; but after the twelfth cast the use of the former in deep water was abandoned, it occupied so much more time than wire, with measurably less accurate results, though the albacore line used was about the size of the rope with which the "Challenger's" soundings were made. It had not near the strength of her carefully prepared line, however, and there was constant fear of its breaking, as it would do after half a dozen casts. The calm weather which prevailed a good part of the time was very favorable for sounding, but, together with the interruption of several southeast gales, made such inroads upon the coal that, after a run of eleven hundred miles, and the uncertainty of getting a fresh supply at the Aleutian Islands, the ship's head was reluctantly turned back to Puget's Sound. Twenty-five casts had been made with the wire in deep water with marvelous ease and without mishap, and the original drum had served to do them all, though now hanging out a warning signal of distress; a little patching and soldering, however, made it serviceable again, and it was still to do much good work before being placed on the retired list.

The last and deepest cast was in two thousand five hundred and thirty-four fathoms, and after passing a ridge some two hundred miles west of Cape Flattery, the average descent of the ocean-bed had been a fathom to a mile. The time occupied in making this deepest cast was one hour and forty-four minutes, and a comparison with the "Porcupine's" sounding in two thousand four hundred and thirty-five fathoms, already described, showed a difference of fifty-one minutes in favor of the "Tuscarora." This was pretty good for a beginning; but the "Tuscarora" came in time to regard a cast of two thousand five hundred fathoms as a mere bagatelle, in all sorts of weather, and averaged only one hour and twelve minutes in sending the lead down that depth and bringing back a specimen.

An officer writing from the "Challenger" to the English magazine *Naval Science*, in 1873, stated that "the sounding alone at a depth of two thousand five hundred fathoms occupied them three hours, including heaving in the line!"

The Department now deemed it advisable to discontinue the work on the northern route until the next summer, and telegraphed the ship to return to San Francisco, sounding *en route* "off and on," to ascertain "the true continental outline or beginning of the ocean-bed proper,"—a work Professor Agassiz had had much at heart. Eighty-three soundings were made, and some of the lines extended seaward two hundred miles, the deepest water found being two thousand four hundred and forty-three fathoms. Unlike the shores of the North Atlantic, the bed was found to be very abrupt in its descent, and a run of seventy miles off

the coast would sometimes disclose a fall of about two thousand fathoms, or two and a quarter miles. About half these soundings, the shoaler ones, were made with rope; those made with wire were still mostly the work of the much patched and doctored original drum.

Shortly after arrival at San Francisco the Cuban flurry came on, and in view of possible war with Spain the ship's battery was restored, and she could now fight or sound whenever called upon to do either. The whole wire apparatus, exclusive of sinkers, took up little more space on deck than a division-tub, and the entire absence of everything betokening anything more than the ordinary work of a man-of-war was noticeable.

While waiting the turn of events advantage was taken of the detention to still further improve appliances, and two new drums were constructed of heavy sheet iron, and one of them filled in with wood to help resist the crushing pressure in reeling in. Finally, about the middle of December, continued friendly relations with Spain had become so far assured that the ship was ordered to proceed to San Diego, sounding "off and on" for continental outline, and to take departure from that port in running a line of soundings across the Central North Pacific *via* the Hawaiian and Bonin groups.

Fifty-eight casts—the deepest in two thousand one hundred and sixty-five fathoms—were made *en route* to San Diego, and the original drum did all the work; the same outline was developed, and a retreat of the waters would show a continent buttressed and bastioned like an immense fortress.

Filling up with coal and taking a good supply on deck, the ship left San Diego on the 6th January, 1874, and on the 2d February anchored in the harbor of Honolulu, having made sixty-two casts in depths ranging from seventy-one fathoms to three thousand and fifty-four fathoms; the apparatus had worked beautifully, and no accident had occurred to mar the gratification resulting from the work; and report was made to the Department that "the Thomson machine was as sensitively perfect at three thousand and fifty fathoms as it had been at lesser depths, and whether sounding at night or by day the results were equally accurate and indisputable; that four different tests gave proof of accuracy, viz., the action of the dynamometer, the stopping of the revolutions of the drum, the detachment of the sinker, and the bringing up of the bottom soil; and, in short, that were soundings taken in air to the earth's surface from a balloon, the results would not be measurably more accurate than these deep soundings in the ocean." This part of the Pacific does not seem to be much affected by surface or under-surface currents; and while Lieutenant Norris was reeling in at the gangway, Lieutenant-Commander Jewell would send down the thermometers from the forecastle for serial temperatures; only once did the wires come together, and then no harm ensued.

As the water deepened on approaching Honolulu the officers were curious to know the result of each cast, and, whenever a sounding was made towards evening, would gather in the port gangway with post-prandial cigar, to watch the reel, speculate as to the depth, and possibly indulge in a little quiet betting; but doubtless not more extravagantly than did that impressible and imaginative officer who, in the midst of an exciting heat at the Jerome races, vociferously hailed a naval friend, surrounded by ladies on the grand stand, to say that "he would double that bet!" whereat the other, gravely referring to his book, replied, "That makes just one dollar!"

Those days on nearing Honolulu, when every cast and answering demand on the apparatus seemed a revelation, and all were on the "tip-toe of expectancy" for the delights of the Hawaiian capital; the lovely weather and fair fresh trades, where every sail—studding-sails on both sides—drew with billowy strength, and a moment's loss of the favoring gale seemed vexatious delay to the less earnest and interested souls aboard,—who of the "Tuscarora's" will ever forget them? Or how the swelling canvas, now a cloud of inspiriting promise, would suddenly collapse, as it were, into angrily-flapping festoons, and, caught up by brisk and brawny arms, be fast bound to the straggling yards, as if by magic, and the lead started down on its mission to the dark abysms below to question and snatch answer from the mysteries hidden since the "gathering together of the waters"? Or how, when the never-failing messenger came back freighted with welcome and gratifying response, the imprisoned sails were again unloosed and spread to the beckoning breeze, in a manner befitting the halcyon days when steam had not made havoc of the poetry of the sea nor blunted the skill of seamen,—real work, quickly, cheerily, well done,—unseen of inspection boards in humdrum routine of harbor exercise,—and the good ship pressed on once more with resistless bound and surge, bearing a rejoicing company,—the details of the last cast a happy theme until the next one made it an old story?

Reckoning from the nineteen hundred fathoms' curve, near San Diego, to the two thousand one hundred fathoms' curve, close to Oahu, the mean depth of this region of the Pacific is two thousand five hundred and sixty-two fathoms, which confirms in a happy manner the deductions of the late Superintendent Bache and Professors Hilgard and Davidson of the Coast Survey, drawn from observations on the rate of tidal movements across this ocean. Professor Davidson illustrated this point in an interesting lecture before the California Academy of Sciences during the summer of 1874. The first six hundred miles from San Diego, taking the depth of nineteen hundred fathoms as the beginning of the ocean-bed proper, the depth increases in varying curves four hundred and ninety-four fathoms; thence a distance of one thousand and fifty miles the water deepens only two hundred and eighty-six fathoms;

in the next five hundred miles the bed gradually descends to a depth of three thousand and fifty-four fathoms, when, after an intervening ridge of three thousand five hundred feet in height, the bed suddenly rises to a depth of nine hundred and thirty-seven fathoms, eighteen miles from the Hawaiian group.

The original drum, as willing as the little donkey-engine on board the "Porcupine," whose pantings drew forth the pitying comments of Sir Wyville Thomson in his "Depths of the Sea," had still done much of the work on this line, but the increased depths had told on its strength to such a degree that it was now remanded to the forecastle for the taking of serial temperatures.

Up to two thousand five hundred fathoms the labor of reeling in hand over hand by means of the endless rope, spelling the men frequently, had been comparatively quick and easy, but since the deeper water had been reached some relief in this regard seemed necessary.

An iron fly-wheel some four hundred pounds in weight was therefore cast in Honolulu, and a grooved wooden disk fastened to it to take one bight of the endless rope. The wheel was mounted on standards placed on the flying-bridge which crossed the ship from gangway to gangway, and cranks were fitted on each end of the shaft, with room for four men to work them.

This arrangement helped matters materially, and with the large crew of a man-of-war the writer would prefer it to an engine for the purpose in question. A new reel constructed of light boiler-iron was also made, and since experience showed there was no objection to a very material increase in the weight of the drum, it was suggested to the Bureau that a steel drum might be cast strong enough to withstand the strain imposed upon it. This has been done, and such a reel was first thoroughly tested by Commander W. S. Schley, U.S.N., commanding the U. S. S. "Essex," in running a line of soundings across the South Atlantic, from St. Paul de Loando, Africa, to Cape Frio, Brazil, *via* St. Helena, in the winter of 1877–78. The soundings averaged about one hundred miles apart,—several of them in depths of over three thousand fathoms,—and the work was done without the loss of a fathom of wire or any instruments, or developing any weakness in the drum. Commander Schley entered upon the work with hearty interest and earnest effort, and brilliant success rewarded him.

But we must hasten across the Pacific. The charming capital of the Hawaiian group—

> Where dusky belles sweet life enjoy
> In never-ending hula,[1]
> Nor dream of aught but fish and poi,
> In bonny Honolulu—

[1] Dance.

was left behind on the 17th March, and as we catch the strong trades when well clear of the land, let us stop and take an imaginary cast. Half an hour before reaching the desired position the banked fires are spread and the Thomson machine rigged in the starboard gangway,—which was found to be the best place to sound from the "Tuscarora." When the steam is ready, the ship is stripped of her canvas and made snug in a twinkling, the head-yards laid square, the after-yards braced up by the port braces, and the jib kept with taut or flowing sheet, as circumstances require; meanwhile the ship has been brought stern to wind and sea, the engines backing or going ahead as necessary, to keep her in that position. She could not be readily kept head-on in sounding like the "Challenger," "Narragansett," or "Essex"; for ships, like animated objects, notably humankind, have contradictory qualities, and have to be humored accordingly. Now the pendant of the friction-line or endless rope is well weighted, and the detachable sinker bent on to a piece of albacore line twenty-five fathoms in length, and, with thermometer attached, is carefully lowered by hand until the wire appears, made fast together with the other end of the stray-line to a small rope grommet or ring,—the object of the intervening or stray-line, be it understood, is to prevent the wire from touching bottom, as in that event it would be apt to kink and break; and, as a further precaution in that direction, a small oval-shaped lead of three or four pounds' weight is attached to the grommet to keep a strain on the wire and prevent its flying upwards when relieved from the greater weight of the sinker on reaching bottom. All being ready, the lead is started on its errand, but made to go down slowly at first, the velocity being gradually increased by taking off some of the restraining weights on the pendant; but the wire is never permitted to run faster than at a rate of one hundred fathoms to fifty seconds. Two petty officers stand each side of the drum, on a platform outside the vessel, to attend the wire and guide it fair if necessary; and the officer in charge, and a clerk to record the revolutions, stand just inside of them. Every one hundred turns of the drum as registered by the counter turned by the wormed wheel on the axle of the reel is noted, as well as the *number* of the splices as they go out, for the wire comes in lengths of from eighty to one hundred and twenty fathoms, owing to the impossibility of manufacturing longer coils of homogeneous strength; and the number of fathoms in each splice, and the number of the splice, is carefully measured and noted, and registered in a book as the wire is first wound on the reel. It may be mentioned here, that one of the supposed drawbacks in the use of wire was in the making of safe splices, but that difficulty was purely imaginary; the splices were made with long-jawed twist, two feet in length, the ends and one or two points in the middle lightly soldered, and the whole served with waxed twine; no splice ever failed, nor did any break ever occur at a splice. Before reaching the supposed

depth, the weights on the pendant are increased, so that the strain on the dynamometer will exceed by a few pounds the weight of the wire out. When bottom is struck the drum stops instantly, but with the motion of the ship, if uneasy in a seaway, will start again, and make three or four turns in a *sluggish* way, which to the experienced eye is a sure sign that the lead is on the bottom. The sinker being on the bottom, a few turns more are allowed to run out "to make assurance doubly sure," and to allow a little slack for the rolling of the ship, but care must be had not to allow enough to run out to let the wire touch bottom, as in that case it would be almost certain to kink and break. Then the check-line is cast off from the dynamometer-wheel so that the latter can now turn; and the officer in charge takes hold of the pulley-line and hauls in till he thinks the cylinder is off the bottom, minus the sinker; the men then man the line and reel in fifty fathoms, when the officer again tries the line himself, and if still satisfied the sinker has been detached, the wire is clamped and the order given to "shift belts," and the men go to the reeling-in-wheel. The dynamometer-wheel is unshipped and a fresh and stouter rope is substituted for the friction-line; the inner bight of which is passed over the reeling-in-wheel instead of the weighted pulley. Now the wire is unclamped, and the men begin to reel in, slowly at first, but after a little while as fast as they can do it,—relieved at every one hundred and fifty turns it makes light work for the watch. The cast completed all sail is made; the fires banked; the machine unrigged; and the reel placed in a tub containing a solution of caustic soda to preserve the wire from rust. All this time the ship has been thumping and pounding her stern against the heavy sea in the strong trade region, and which sometimes boards the vessel over the poop; and it is a relief and a comfort to be on the way again, albeit, the sea may roll in over the gangway once in awhile and keep all afloat under-foot. So continues the work week after week, sounding at night as well as by day and in all sorts of weather; for surveying a cable route is a far different matter from getting a cast every other day in the day-time, with due regard to the weather, as was the case in the "Challenger" expedition.

True, the "Challenger" had the dredging and trawling to do afterwards, but that was a simple matter after the depth was found, though occupying much time; yet one never tired watching the working of the reel, so noiseless and perfect in its action, and the wire so fine that it could hardly be seen from the poop-deck in cloudy weather, or when passing clouds threw shadows over the ship. Sometimes at the approach of evening the writer stood in the cabin doorway watching, in the deepening twilight, the movements of the drum, and could detect instantly the moment of striking bottom, although the revolutions could only be distinguished by certain discolorations on the sides of the drum as they met the eye in passing round. At

night, too, the gleams of the lantern flashing on the drum—only needed for the reading of the counter and the noting of the splices—revealed its motions and indications at the far ends of the ship equally well. This might be called the very poetry of deep-sea sounding, as, indeed, it was its very perfection.

The run to the Bonin group occupied twenty-nine days, and the results were of a most interesting character; but two losses of wire in three thousand fathoms of water had to be recorded, due to the fact that the sinkers got jammed and would not detach. The under-surface currents sometimes play strange freaks with the stray-line, and on two known occasions, and doubtless on others, prevented the shot from detaching. On the last occasion of such a mishap the sinker had to be hauled back from a depth of nineteen hundred fathoms; the slings had been freed from the trigger, but the stray-line had taken half a dozen turns round slings and rod and hitched itself; the slings were thus lashed fast to the rod as though done by hand, and there was no possibility of getting rid of the sinker. To overcome this difficulty, a rod of stout wire, one-eighth of an inch in diameter and a fathom in length, was fitted with an eye in each end to go between the rod and stray-line; the idea being that the rod in falling would take the line clear of the detacher. No more trouble of that kind was had after the adoption of that device.

But to return from this digression, it was found that the contour of the ocean-bed loses its regular character passing westward from the Hawaiian Islands, and were the waters of the Pacific drained, six ranges of mountains varying from seven thousand feet to twelve thousand six hundred feet in height would stand revealed between the two groups in bold and rugged outline, clothed on their sides and tops with coral limestone, sand and lava, and solid rock, with yellowish-brown soil in their valleys. The deepest water found was three thousand two hundred and eighty-seven fathoms, and near the Bonin group. Fifty-nine casts had been made in all, eighteen of them in over three thousand fathoms, and the reels began to present a sorry appearance, though one after the other had been in the hands of the coppersmith for repairs most all the passage.

Three days were spent at Port Lloyd, Peel Island, of this forlorn group, containing a population of only sixty-five souls, and seldom visited except by whalers, when the ship's head was turned towards Yokohama, and the soundings renewed. Twelve casts were made,—the deepest in two thousand four hundred and thirty-five fathoms, and Yokohama reached on the 22d of April. Never was a more welcome sound than the plunge of the anchor and the rattling of the chain as the ship came-to astern of the grand and historic old "Hartford"; and, after much hard work and anxiety, it was a great gratification to cable the Department that the mid North Pacific line had been completed.

The "Challenger" was now and then heard from through the newspapers, and it seemed a marvel that she not only did not use wire for sounding, but wire rope for dredging. The demonstration in favor of wire was so complete in the eleven hundred miles of soundings from Cape Flattery towards the Aleutians, September, 1873, that had the orders and objects of the "Tuscarora" expedition justified dredging, requisition would have immediately been made for steel-wire rope for that purpose.

Such rope is now used in the Coast Survey for dredging, and was first introduced in the winter of 1878. Mr. Alexander Agassiz, in "letter No. 1 to Superintendent Patterson, on the dredging operations of the 'Blake,' January and February, 1878," states that "he suggested the use of wire rope for use in the dredgings"; but unless the supposed advantages of that kind of rope for the purpose in question occurred to him previously to October, 1873, the writer emphatically claims in behalf of the naval profession priority of belief and original contemplation of its general use. Yet we must concede that to Mr. Agassiz doubtless belongs the credit of first bringing the rope into requisition, and, with Sigsbee's management, demonstrating its great superiority over the dredging-lines of the "Challenger." The dredging methods of the "Challenger," indeed, would seem to be already obsolete, from the greater facility and economy of labor and time as practiced on board the "Blake," since, as Mr. Agassiz says, "in the British vessel the best part of the day was generally consumed in making a haul, at a depth of fifteen hundred fathoms," while "several hauls in like depths were made from the 'Blake' in a day," working in the Gulf of Mexico and Florida Channel.

After a stay of about seven weeks at Yokohama, the ship started to complete the northern line of soundings *via* the Aleutian chain. New drums had been made of still heavier boiler-iron, and strengthened by every device that experience and skill could suggest. Departure was taken on the 9th of June, and on the 11th the lead sunk from fifteen hundred and ninety-four fathoms to three thousand four hundred and twenty-seven fathoms in a run of only thirty miles, and at a distance of one hundred miles from the coast. Startling as was this revelation, the next cast was still more extraordinary, when the wire ran out four thousand six hundred and forty-three fathoms and then parted. It was in the Kuro Siwo, or black stream of Japan, and the current so strong that the wire was swept under the ship in spite of all that experienced management could do, and it broke under the strain. The amount of wire on board and the purposes of the survey would not admit of continued experiments, nor was it believed that a cable could be successfully laid in such deep water encountering so strong a current, and the ship was headed in shore to run up the coast and begin the line where the influences of the current would be less marked and obstruc-

tive. After a run of two hundred and forty miles up the coast, or to latitude 40° north, fresh departure on the great circle towards Tanaga, of the Aleutian group, was taken; but the water deepened rapidly again, and at the third cast from the initial curve three thousand four hundred and ninety-three fathoms were found, followed up by depths of three thousand five hundred and eighty-seven fathoms and three thousand five hundred and seven fathoms respectively, forty and eighty miles farther on; then, in the next forty miles, the ocean-bed was found to drop to the extraordinary depth of four thousand three hundred and forty fathoms, and the Miller-Casella thermometer came up a perfect wreck.

The next six casts were in four thousand three hundred and fifty-six, four thousand and forty-one, four thousand two hundred and thirty-four, four thousand one hundred and twenty, four thousand four hundred and eleven, and four thousand six hundred and fifty-five fathoms respectively. Good specimens were brought up from four of these depths, and in one other the cylinder had struck solid rock. The wire parted at the last two and deepest casts. The first break was due to the jumping of the friction-line out of the V-groove of the machine,—the result of momentary carelessness on the part of the men at the reeling-in wheel,—the second one to the fact that the wire was part of a new batch received at Yokohama, of twenty-five per cent. less strength than the wire first supplied,—and after reeling in four hundred fathoms it broke. It seemed to have pulled fairly in two from the strain at that great depth, five and a quarter miles.

Such losses could not be borne long with the amount of wire on board, and believing that it would be possible to find a more suitable bed for the proposed cable by running back in shore, and skirting the Kurile chain for some distance before crossing over to the Aleutians, that plan was adopted, and the ship ran back to Hakodadi for a fresh supply of coal.

These deep casts had been made under the most favorable conditions: light wind, smooth sea, and gentle swell; the wire had run straight down as though sounding in a pond or dropping a plummet into a well, and the indications of the dynamometer were as wondrously perfect and unmistakable as ever. Indeed, there could be no mistaking the instant of touch, and the demonstration seemed clear and indisputable that any system of showing when bottom is struck, based on intervals of descent, must be crude and unsatisfactory as compared with the unmistakable and perfect indications given by the Thomson apparatus and wire.

So far, these are the deepest soundings ever made, and the tabular detail of one of the casts is given at the end of this paper.

It had hitherto been believed that the deepest water would be found

in the eastern portion of the Pacific, but these researches had proved to the contrary.

The "Challenger" subsequently made one cast in four thousand four hundred and seventy-five fathoms between the Ladrone and Caroline Islands, bringing up a bottom specimen,—the only depth in over four thousand fathoms she sounded during the entire four years of her cruise. Of this cast, Lieutenant Campbell, R.N., says, "We had to sound twice to make sure, as the weights were not sufficient in this case.

"Two of the thermometers were smashed, though the third was not, very strangely; it registered 35° 2, not corrected for pressure, which correction, beyond three thousand fathoms, we did not know."

With regard to these deep soundings, Mr. John James Wild, Member of the Civilian Scientific Staff of the "Challenger" expedition, says, in his Essay on the Depth, Temperature, and Currents of the Ocean, that "the greatest of all depths of which we have reliable evidence, was found by the 'Challenger' on the 23d March, 1875, in the comparatively narrow channel which separates the Caroline Islands from the Mariana or Ladrone Islands. This sounding is situated in latitude 11° 24′ N., longitude 143° 16′ E., and amounts to four thousand five hundred and seventy-five fathoms, or about five miles and a quarter. Several soundings exceeding four thousand fathoms were obtained by the 'Tuscarora' to the eastward of the islands of Niphon and Yezo, and another close to the most westerly of the Aleutian Islands. Two of these soundings are over four thousand six hundred fathoms, but, as it appears that no sample of the bottom was brought up, there is no evidence of the bottom having been reached. H. M. S. 'Challenger,' shortly after her departure from Yokohama, sounded in three thousand nine hundred and fifty and three thousand six hundred and twenty-five fathoms, and in doing so seems to have just touched the southern border of this deep but narrow area of depression, which runs parallel to the eastern coasts of Japan and the Kurile Archipelago as far as the entrance to the Behring Sea."

Now, Sir Wyville Thomson, Director of the Civilian Scientific Staff of the expedition, in an address delivered at a meeting of the Asiatic Society of Japan, at Yokohama, June, 1875, said, "Since we started, Captain Belknap has sent me an extraordinary series of soundings, which none of us have the slightest doubt of being absolutely correct, which give depths with which we were previously unacquainted." Had Mr. Wild been familiar with the Thomson machine and its working, he would doubtless not have ventured to throw discredit upon the "Tuscarora's" work in this instance. No claim was made that the depth was ascertained in the swift-running current of the Kuro Siwo, where four thousand six hundred and forty-three fathoms of wire ran out, and,

swept with resistless force under the ship and astern, broke without giving any indication of reaching bottom; but there was no more doubt of the true measurement of the depth at four thousand six hundred and fifty-five fathoms, where the wires broke in hauling back, than when a good specimen of yellowish mud, with sand and specks of lava, came up in the cup from four thousand three hundred and fifty-six fathoms; or where Captain Nares, in the Hydrographic Proceedings of the "Challenger," reported bottom at two thousand six hundred and seventy-five fathoms, and three other lesser depths, sounding in the Atlantic, where the line parted and "no sample of bottom was brought up."

The writer will only add that it is not the habit of officers of any respectable naval service, charged with important and responsible duty, to make reports to their respective governments not borne out by the facts. In this connection, it seems a little strange that Lord Campbell, in his entertaining and graphic "Log Letters" from the "Challenger," should have questioned the results obtained by a sister service.

No doubt has been thrown upon the "Challenger's" admirable work by any American pen the writer has ever heard of, and the same candor and courtesy is asked at English hands by American hydrographers, especially as the history of deep-sea research, impartially written, makes a record gladly welcomed by American workers, whether as to methods, results, or accuracy.

The greatest depth yet found in the Atlantic was sounded by the "Challenger," about eighty miles north of St. Thomas, in the West Indies, where the "Baillie-Hydra" rod brought up a specimen from three thousand eight hundred and seventy-five fathoms. Subsequently the U. S. S. "Gettysburg," Lieutenant-Commander F. M. Green, using the Thomson machine and modified Brooke apparatus, got bottom in three thousand five hundred and ninety-five fathoms, eleven miles south of the "Challenger's" deep cast, and three thousand six hundred and ninety-seven fathoms one hundred and thirty miles north of it. In the waters of the Indian Ocean the deepest sounding yet made was by the German frigate "Gazelle," May, 1875, working in three thousand and twenty fathoms, in the region "between the northwest coast of Australia and the line of islands extending from Java to Timor."

Mr. Wild, in discussing these exceptional depths, to which may be added one of three thousand four hundred fathoms, sounded by Brooke, in 1858, in the North Pacific, some three hundred and thirty miles east of the northern point of Luzon, of the Philippine group, takes note of the fact that "they are not placed, as one might conjecture, in or near the centre of the oceanic basins, but, on the contrary, upon their confines, and in close proximity to the land." "This remarkable circumstance," he continues, "suggests the idea that such areas of depression may be the effect of a sinking of the bottom of the sea in compensation

for an upward movement of the land in their immediate vicinity." This seems reasonable, but is it not pertinent to ask why such depressions along the eastern borders of the Pacific—where the back-bone of the southern half of the American continent, the rugged and lofty Andes, with their numerous volcanic peaks, approach close to, and run along, its shores, from Cape Horn to the Gulf of California—are not found to exist so far as has yet been revealed by the lead?

Perhaps another noteworthy fact demonstrated by deep-sea research up to this time is that by far the deepest waters are found in the Northern Hemisphere, and, as the highest mountains on the globe are found in the eastern part of Asia, so the greatest depressions yet discovered in the ocean-bed are in the Asiatic, North Pacific, and close to the outlying islands of the continent.

Hakodadi was left on the 30th of June, and after sounding along the shores of the Kuriles as far north as latitude 48°, the course was laid across to Agattou, the southwesternmost of the Aleutian group.

The water again deepened rapidly on leaving the coast, and a depth of three thousand seven hundred and fifty-four fathoms was found about one hundred and ten miles east by south from Cape Lopatka,—whence the bed rises and forms a ridge between that point and the Aleutians like the "Dolphin Rise" in the Atlantic,—the trough next the latter group having a depth of four thousand and thirty-seven fathoms, and distant from Agattou only eighty-six miles. The least water found on the ridge was seventeen hundred and seventy-seven fathoms.

The island of Tanaga was now soon reached, and after a survey of Glory of Russia Bay, a beautiful harbor on the west side of that island, the line was continued on through Behring's Sea to Ounalaska, the headquarters of the Alaska Commercial Company, where mails and coal were awaiting the ship. After a stay of nine days in that dismal port, the ship again put to sea to finish the survey, and on the 21st of August the last cast was made; the work was done,—how, let the record attest. The apparatus was now stowed away, and all sail crowded for San Francisco. Probably there was no happier man on board than Lieutenant George A. Norris, who had attended the reel at all the casts with wire, and had become so expert that any sounding under three thousand five hundred fathoms was considered a light matter. Himself and chief quartermaster, Daniel Burns, had established so complete an understanding with the machine that they were never at a loss to meet any demand made upon it. Their skill yet remains to be surpassed. It will not be an easy matter to put it in eclipse, as later work amply attests.

The work on the northern line from the coast of Japan to the Aleutians had been full of surprises, but one more still awaited the ship upon clearing Behring's Sea, for, in view of the results obtained in the

eastern North Pacific, or Gulf of Alaska, the previous year, it was thought that about the greatest depth had been reached in that part of the ocean; it was found, however, that a plateau only from thirty-three to forty-six fathoms below the surface extends eastward from Ounimak Pass some eighty miles, when the bed begins to drop, sometimes moderately, sometimes abruptly, until a depth of three thousand three hundred and fifty-nine fathoms is reached in a run of one hundred and fifty miles, and only sixty miles from the nearest land; then the water shoals slowly for the next one hundred miles to a depth of two thousand five hundred and twenty-five fathoms, when the bed becomes regular and gently undulating to the point surveyed in 1873, the connecting positions, thirty miles apart, showing a difference of fourteen fathoms only in depths, and affording signal proof of the accuracy with which deep-sea soundings can be made with the Thomson machine and piano-wire.

Determining to avoid the deep hole of three thousand three hundred and fifty-nine fathoms, if possible, lines of soundings from twenty miles to fifty miles, both north and south of the great circle, were run; the greatest depth found north of the circle was two thousand nine hundred and ten fathoms, and three thousand six hundred and sixty-four fathoms south of it.

Thus, the existence of a deep submarine valley, running in a direction parallel to the southwestern coast of the peninsula of Alaska, was disclosed, and taking into consideration the extraordinary depth found in the vicinity of the island of Agattou at the other end of the Aleutians, it is not improbable that this deep valley or trough extends along the whole length of the chain on the southern or Pacific side. And in view of the remarkable character of the ocean-bed in the entire region of the western North Pacific, over which the "Tuscarora" sounded, a more complete and extended examination of that part of the Pacific basin would undoubtedly be of great advantage to hydrographic science. Lines of "off and on" soundings on both sides of the Aleutians could not fail to yield interesting results, and the width and greatest depth of the trough under the Japan stream would seem to be problems of such surpassing interest and value as to suggest the attempt at their solution at an early day.

Compelled to abandon the route across the deeper part of the Japan stream, owing to its impracticability for cable purposes, and for the lack of time and a sufficiency of wire to run the risk of loss with a long line of soundings ahead, the writer is still confident that a vessel provided with the Thomson machine, and a supply of wire ample enough to warrant the risk of possible frequent losses, can determine the depth in any part of the stream, whatever the strength of the current may be. And, in short, the Thomson machine is so compact and simple, and its working so perfect and manageable, that all ships-of-war might carry them without incumbrance; and international co-operation in their use

would, in the course of a few years, enable hydrographers to map out the principal features of the bottom of the sea with almost as much accuracy as the physical aspects of the land surface are now shown by geographers.

The character of the bottom on the northern line is diverse. Close along the coasts of Japan and the Kurile Islands the bottom is composed of grayish-black sand, with gravel and specks of lava; as the coasts are left and the water deepens, mud of clay and yellow-brown colors, sometimes mixed with sand, sometimes with gravel, is found; and at one cast in three thousand four hundred and ninety-three fathoms hard yellow sand with black specks was brought up; an unusual kind of soil for that depth.

Crossing the deep trough under the Japan stream, the curve of departure beginning at latitude 48° north, whitish ooze with fine sand was first found, then clay mud and clay-colored ooze, the latter sometimes containing fine particles of sand. From the ridge discovered beween the shores of Kamtschatka and the Aleutian group, yellowish mud, and yellow ooze with hard lumps of clay and particles of fine black sand, were brought up in the specimen cups.

Upon nearing the Aleutians the bottom becomes of a clay color again, the mud sometimes mixed with gravel, sand, and fragments of lava; and along the shores of that group, both north and south, the black sand and gravel is again found, but often containing a good percentage of the clay-colored mud.

The bed under the deep water in the Gulf of Alaska, found after leaving Ounimak Pass, yields a stiff hard clay.

A study of the surface and under-surface temperatures yields interesting results. Great care was taken to make the observation as accurate as possible, and the surface temperatures are invariably means of four and five thermometers. Whenever there was any doubt, or any marked change in temperature, the observations were always repeated. In taking the under-surface temperatures along the Kurile Islands, the indications of the Miller-Casella thermometers were sometimes so startling and perplexing, the indicated temperature being so low, that the observations were often duplicated to verify their accuracy; if the second observation confirmed the first, the results were accepted as true; otherwise, they were rejected.

Proceeding in this way, a cold stratum between two warm strata was found to exist quite near the surface, between the parallels of 49° and 52° north latitude and the meridian of 158° and 167° east longitude. The upper part of the stratum in one place, showing a temperature of 33° 7 F., was only twenty fathoms below the surface, while at ten fathoms below the surface the temperature was 41° F. At a depth of one hundred fathoms the temperature was 32° F.; below that curve to a depth of two hundred fathoms, the range of temperature was from

34° 5 F. to 38° 7 F. The width of this cold stratum gradually narrowed to a point in an easterly direction from the coast, or as the edge of the Japan stream was approached.

It may be said here that the indications of the Miller-Casella thermometers are not always reliable, as the needles sometimes jump in the tubes, and this was especially the case on this northern line, where the changes of under-surface temperatures are so much more sudden than in the central North Pacific, where serial temperatures were taken by the "Tuscarora."

In three or four instances the thermometers came up from the bottom and intermediate depths indicating temperatures of from 20° F. to 28° F.; temperatures manifestly impossible.

There can be no doubt, however, of the existence of the cold stratum described above, as no temperature was recorded until repeated observations with different thermometers confirmed its accuracy. And these observations are in accord with those made by the then commander, John Rodgers, commanding the North Pacific Exploring Expedition, already mentioned, with his non-conducting water cylinders, in the "Arctic," during the summer of 1855, where he found "warm and light water on top, cool water in the middle, and warm and heavy water at the bottom."

An inspection of the surface temperature chart will show that the coldest surface water was found along the Kurile Islands, between the parallels of 45° and 47° north latitude. The temperature of the air was also lower in that region than at any point farther north, and the lowest snow-line was observed there, though the range of latitude traversed was nearly 8° higher. The current in that locality was found to be setting in a southerly direction, and undoubtedly pouring out of the Sea of Ochotsk.

The surface temperatures along the Aleutian Islands show considerable variation, both in the Pacific and Behring's Sea, doubtless attributable to tidal influences, the direction of the wind, and the meeting of different currents.

In passing from Behring's Sea to the Pacific, through Ounimak Pass, on the morning of the 17th of August, the surface temperature rose 7° in one hour, some five to seven miles inside the pass, the current at the time setting with moderate strength into the sea.

The lowest surface temperature along the Kurile group was 36° 4 F.; along the Aleutian Islands the surface temperature ranged from 41° 6 F. to 49° F.; and along the continuation of the line, across the Gulf of Alaska to Cape Flattery, the range of temperature was found to be from 50° F. to 59° F., indicating in the most unmistakable manner the influence of that branch of the Japan stream which, curving to the northward near the meridian of 140° west longitude, impinges upon the coasts of Alaska, and, following the line of the shores bordering on

the Gulf of Alaska, sweeps back to the westward and southward, and westward to the Aleutian chain; for the moment Ounimak Pass is cleared, the temperature of the water rises, and the current is found to be setting to the southward and westward.

The following table will show some of the differences of temperature observed on the line sounded from Honolulu to the Bonin Islands, and that part of the northern line from the southern point of Kamtschatka to Ounimak Pass, in Behring's Sea:

	Southern Line. Central North Pacific.	Northern Line. North Pacific and Behring's Sea.
Surface,	70° to 76° Fahr.	36° 4 to 49° Fahr.
Under-surface, 30 fathoms,	70° 8 " 78° 5 "	31° 5 " 41° 9 "
50 "	63° 5 " 72° 7 "	31° 9 " 39° 7 "
100 "	62° " 70° "	31° 1 " 38° 5 "
200 "	48° 5 " 58° 7 "	34° 3 " 37° 9 "
300 "	41° 4 " 50° 3 "	34° 4 " 37° 3 "
500 "	38° 9 " 40° 6 "	34° 8 " 35° 9 "
1000 "	35° 5	33° 5 " 33° 8 "
2000 "	33° 2 " 33° 9 "	33° 5 " 33° 8 "
3000 "	33° 2 " 33° 9 "	33° 1 " 33° 3 "

The very low temperatures noted at the depths of from thirty fathoms to two hundred fathoms are some of those observed in the cold stratum already described.

The serial temperatures observed on this northern line were not so extended as could have been wished, owing to the loss and breakage of thermometers, and to the fact that two of the instruments furnished had to be thrown aside as worthless. In the latter case the mercury would crowd up past the needles, rendering the indications valueless, and that defect in those instruments could not be overcome.

When the experience of the "Tuscarora" had shown beyond question the feasibility of the use of wire for sounding, the Coast Survey took it up, but let it be understood—not before; and Lieutenant-Commander Sigsbee, U.S.N., of the "Blake," then an assistant in that service, set about to master its details in earnest. The Coast Survey was extremely fortunate in having the services of so accomplished, energetic, and versatile an officer. His bottle for bringing up specimens of water from the bottom is constructed with an ingenuity worthy the genius of an Edison. He also constructed a sounding machine in accordance with his own ideas,—differing from the plans of Sir William Thomson, and from the methods of the "Tuscarora." His apparatus, with its latest improvements, is now in use on board the "Blake," and has given an excellent account of itself in depths of two thousand four hundred fathoms.

Admirable as the machine may be, the writer, were he called upon to make another sounding cruise, would ask nothing better than the

present apparatus supplied by the Bureau of Navigation to our ships-of-war; the simple steel reel and dynamometer,—modified perhaps with differential brake,—inexpensive, portable, taking up no room for stowage, readily put together, easily manipulated, and as perfect in its indications at four thousand six hundred fathoms as at one hundred fathoms. This opinion is strengthened by the experience and report of Commander Schley's soundings in the "Essex"—already mentioned—across the South Atlantic. The simpler the machines and instruments and the fewer the parts of their mechanism for use on shipboard, the better.

The modification made by Lieutenant-Commander Sigsbee in the mechanism of what was known on board the "Tuscarora" as Specimen Cylinder No. 2, is not by the writer regarded as an improvement.

The "Tuscarora" generally worked in much deeper water, sometimes in double the depth of that sounded by vessels of the Coast Survey, and her appliances worked as satisfactorily as could be wished. We have seen, too, that though the Brooke detacher generally acted perfectly, the stray-line would at times work mischief, but that after that possibility had been eliminated there was no trouble, and one hundred and thirty consecutive casts up to over four thousand fathoms water were made with no drawback of any sort.

Lieutenant-Commander Sigsbee states in brief the claimed advantages of his latest improved machine as follows, viz.: "My machine provides an *Accumulator* to ease the strain on the wire during sudden jerks in reeling-in; and having the accumulator, it is made to serve the following purposes:

"1st. To have the effect of a *Dynamometer* to make known the strain on the wire at all times in reeling-in.

"2d. To have the effect of a *Governor* on the action of the reel in paying-out; to prevent the wire from flying from the reel when the vessel is rolling or pitching constantly.

"3d. To get an automatically increased resistance on the reel—to stop it—at the instant of getting bottom. (The original reel stops instantly if the writer's experience counts for anything.)

"4th. To get a record of the amount of wire paid out, so as not to require interpolation. (A desirable improvement.)

"5th. To apply resistance to the reel, in passing out, without using the somewhat unhandy lead or iron weights.

"6th. To get generally a machine which is easier of manipulation than the original Thomson machine. The Thomson machine has no accumulator, and therefore does not get the advantage that an accumulator offers in so many ways."

Let it also be noted that Lieutenant-Commander Sigsbee so improved the dredging apparatus on board the "Blake" as to have quite revolutionized the methods of dredging, as has already been intimated.

The Golden Gate was entered on the 2d of September, or on the

anniversary of the ship's departure to begin the northern line from Cape Flattery. She had traversed some sixteen thousand six hundred miles of ocean, and made four hundred and eighty-three casts; while the "Challenger's" soundings during the four years of her voyage numbered but three hundred and eighty-four.

One hundred and sixty of the "Tuscarora's" casts were in depths of two thousand fathoms and upwards, thirty-two of which were in more than three thousand fathoms, and nine of them in depths ranging from four thousand fathoms to four thousand six hundred and fifty-five fathoms.

The specimens of bottom soil obtained were turned over to the Smithsonian Institute by the Bureau of Navigation, but, for lack of funds, they have not yet been examined and reported upon. This is unfortunate, in view of the fact that the results of the "Challenger's" cruise are given to the world as fast as worked up by an interested and well-paid staff of examiners.

Shortly after arrival the writer relinquished command of the vessel to Commander Henry Erben, who ran a line of soundings from San Francisco to Honolulu. Erben's soundings developed pretty much the same contour of ocean-bed as had been found on the line from San Diego, but he discovered a submarine rocky peak about one-third the way across from the coast of California, with only four hundred fathoms over its highest point; the height of the mountain from its base was over eleven thousand feet. Subsequently, Commander J. N. Miller took the ship, and sounded from Honolulu to Brisbane, Australia, *via* the Phœnix group and the Fejees. He made eighteen casts in three thousand fathoms and upwards, the deepest being in three thousand four hundred and forty-eight fathoms; and one hundred and seven soundings in all.

It will be remembered how he refreshed the inner man after one of these casts with champagne cooled at a depth of three thousand and eighty fathoms; and a friend suggested that "Davy Jones's locker" may hereafter be known as "Joe Miller's refrigerator!" Commander John W. Philip is now doing deep-sea work in the vessel off the west coast of Mexico and Central America, and, indeed, if the wire acts as a telephone, the infinitesimal dwellers at the depths will come to recognize the "Tuscarora" as a familiar friend and frequent visitor! Commander Philip, in February last, discovered a deep hole of two thousand nine hundred and twenty-one fathoms, or a depth of three and a quarter miles, only forty miles south of the ugly Tartar Shoal, on the coast of Mexico, close in to the land, near Acapulco.

Commander Dewey, in the "Narragansett," used the apparatus in his survey of the Gulf of California; and in a trial trip to test appliances before sailing, found no difficulty in jumping into two thousand two hundred fathoms of water at the start.

Lieutenant-Commanders Green and Gorringe, of the "Gettysburg," have done good work with the apparatus in the North Atlantic and the Mediterranean, and Captain George Brown, in the "Alaska," found it an easy matter as a regular cruiser to stop and sound in two thousand fathoms and upwards, *en route* round the Horn. It has been seen that Green, with the exception of the one deep cast by the "Challenger," near St. Thomas, has sounded the deepest waters yet found in the Atlantic.

Gorringe was so fortunate as to make the discovery of an extensive bank of pink and white coral, one hundred and thirty miles to the westward of Cape St. Vincent, and directly in the track of vessels. The water suddenly shoaled one day from two thousand seven hundred and fifty-one fathoms to seven hundred and thirty-four fathoms, and a run of only eleven and a half miles from the position of the latter cast disclosed a depth of only thirty-two fathoms. Continuing the examination of the shoal throughout the night and the next day, he quietly anchored the following evening in thirty-four fathoms, and rested his crew.

A subsequent survey indicated this shoal to be "the summit of an isolated submarine elevation which rises regularly from the general depth of two thousand two hundred to two thousand seven hundred fathoms, within a radius of twenty miles from the position of the anchorage."

Commander Schley's admirable work in the "Essex" has already been mentioned, and his hearty enthusiasm in the conduct of the duty assigned him was as refreshing as it is worthy of emulation. His cast in three thousand two hundred and eighty-four fathoms in the region about midway between St. Helena and Cape Frio, Brazil, is the deepest sounding yet made in the South Atlantic.

Recent advices from the "Blake," now under the command of Commander John R. Bartlett, U.S.N., show that she has just closed a season's work of sounding and dredging among the Windward Islands of the West Indies. She made two hundred and twenty soundings and two hundred and twenty-five hauls of the dredge without mishap of any sort, which fact is an eloquent demonstration of the perfection of her appliances and the skill with which they were managed. The results of the cruise make a rich and valuable contribution to the annals of hydrographic science and discovery; and of which Mr. Alexander Agassiz, who accompanied Commander Bartlett on the expedition, gave an interesting summary in a paper read before the recent session of the National Academy of Sciences, held at Washington.

In extending its operations to the Antilles, the Coast Survey would seem to be as elastic in its jurisdiction as the British Constitution, but Superintendent Patterson possibly dreams of "manifest destiny," yet would not be caught napping over it.

Journal of Deep-Sea Soundings, North Pacific Ocean, by the U. S. S. "Tuscarora," Commander George E. Belknap commanding, Yokohama, Japan, to Cape Flattery, via Aleutian Islands. Cast No. 31, June 18, 1874.

Number, 31.
Hour, 1 h. 35 m. 26 s., P.M.
Wind, S.E. by S.
Force, 4 to 5.
Weather, b. c. q. m.; clouds, ci. strat. and cum.; prop. clear, 1–2.
Sea, smooth.
Line, piano-wire, No. 22.
Sinker, 8-in. shot and lead-casting on top.
Weight, 72 lbs.
Machine, Sir William Thomson's.
App. for Spec., Belknap's cylinder, No. 2, with Brooke rod and sinker.
Latitude, 44° 10′ N., D. R.
Longitude, 150° 50′ E., Chro.
Barometer, 29.99. Ther., alt. 53°.
Temperatures, air, 53° 5, D. B.; 51° 4, W. B.
Sea surface, 45°.
Under surface, 1200 fms., 33° 7 — 0° 84 = 32° 86 (18,145). (No. of thermometer.)
Depth, 4120 fms.
Bottom, yellow and clay-colored sand, mixed.
Surface current, N.E. by N. 3 fms.
Under current, 10 fms., N.N.E. 3 fms.; 30 fms., W. 1½ fms.; 5 fms., W. by S. 2 fms.; 100 fms., W.S.W. 2 fms.
Value of sounding, undoubtedly good.

Current shown by observation during past twenty-four hours, North 39° E. = 3.3 fathoms per hour.

Fathoms or Revolutions.	Time. Hour.	Min.	Sec.	A.M. or P.M.	Interval. Min.	Sec.	2d diff. Min.	Sec.	Time hauling in. Hour.	Min.	Sec.
.....	1	35	26	...	.....	.....	.....	.....	....	.....	.....
100	1	36	28	...	1	02	.....	.....	....	1	02
200	1	37	17	...	.....	49	.....	13	....	.....	53
300	1	38	07	...	.....	50	.....	1	....	.....	54
400	1	38	59	...	.....	52	.....	2	....	.....	55
500	1	39	40	...	.....	51	.....	1	....	.....	57
600	1	40	36	...	.....	56	.....	5	....	.....	57
700	1	41	33	...	.....	57	.....	1	....	1	00
800	1	42	30	...	.....	57	.....	.....	....	1	08
900	1	43	27	...	.....	57	.....	.....	....	1	07
1000	1	44	27	...	1	00	.....	3	....	1	10
1100	1	45	28	...	1	01	.....	1	....	1	03
1200	1	46	30	...	1	02	.....	1	....	1	17
1300	1	47	32	...	1	02	.....	.....	....	1	19
1400	1	48	36	...	1	04	.....	2	....	1	36
1500	1	49	41	...	1	05	.....	1	....	1	36
1600	1	50	46	...	1	05	.....	.....	....	1	40
1700	1	51	51	...	1	05	.....	.....	....	1	26
1800	1	52	57	...	1	06	.....	1	....	1	47
1900	1	54	03	...	1	06	.....	.....	....	1	41
2000	1	55	12	...	1	09	.....	3	....	1	47
2100	1	56	20	...	1	08	.....	1	....	1	45
2200	1	57	30	...	1	10	.....	2	....	1	47
2300	1	58	38	...	1	08	.....	2	....	1	40
2400	1	59	50	...	1	12	.....	4	....	1	50
2500	2	01	02	...	1	12	.....	.....	....	2	02
2600	2	02	15	...	1	13	.....	1	....	1	37
2700	2	03	27	...	1	12	.....	1	....	1	33
2800	2	04	42	...	1	15	.....	3	....	1	43
2900	2	05	56	...	1	14	.....	1	....	1	36
3000	2	07	08	...	1	12	.....	2	....	1	49
3100	2	08	24	...	1	16	.....	4	....	1	43
3200	2	09	38	...	1	14	.....	2	....	1	51
3300	2	11	02	...	1	24	.....	10	....	1	46
3400	2	12	23	...	1	21	.....	3	....	1	51
3500	2	13	44	...	1	21	.....	.....	....	1	46
3600	2	15	06	...	1	22	.....	.....	....	2	19
3700	2	16	28	...	1	22	.....	.....	....	2	04
3800	2	18	08	...	1	40	.....	18	....	2	03
3893	2	19	41	...	1	33	.....	.....	....	1	41
Time going out.....					44	15	Com'g in.	.....		58	25
							Finished..		3	23	08
							Total time of cast..		1	47	42

Remarks.

Spread fires and furled sails; brought ship stern to wind and sea, engines backing occasionally; ship very quiet and steady; wire ran straight down; cast especially good. Lieutenant Symonds went out in whale-boat to try under-surface currents.

At end of cast made all sail, and banked fires.

Serial Temperatures.

Surface,	45°		
10 fms.,	44°	—0° 00 — 44′	No. 18,060.
20 "	33° 3	—0° 01 — 33° 29,	" "
30 "	32°	—0° 02 — 31° 98,	" 18,143.
60 "	32°	—0° 04 — 31° 96,	" "
100 "	33°	—0° 07 — 32° 93,	" 18,145.
200 "	35° 5	—0° 14 — 35° 36,	" 18,060.
600 "	34° 8	—0° 42 — 34° 38,	" "
1200 "	33° 7	—0° 84 = 32° 86,	" 18,145.

Weights on Pulley.	Dyn. Ind.	
146 lbs.	48 lbs.	
90 "	43 "	40 fms.
65 "	38 "	70 "
50 "	29 "	90 "
25 "	19 "	130 "
50 "	26 "	3200 "
100 "	45 "	3700 "

No. of Revolutions, 3893.
" Measured fathoms..... 4095
Stray line..... 25
Depth 4120

In deep water like this, weight of 8-inch shot increased by addition of lead-casting, as noted above.

In this work new and interesting points of experience are constantly developed; the weather, sea, currents, and qualities of ship impose ever-varying phases and conditions, but an earnest and interested officer knows how to meet them, and finds pleasure in doing so. At every

cast he sees something new to admire and marvel at, and feels a wondering delight in grasping the specimen cups and thermometers as they come back, chilled almost ice cold, from their long questioning journey to the depths below him; the wire so fine as to look almost as light as a cobweb in air, and seeming a miracle of strength and perfection. He feels, too, that in time of peace he could not be more usefully employed, and has the satisfaction of knowing that at every cast he is adding a new fact to the sum of human knowledge, and contributing materially towards the solution of the great problem which, until a recent period, hung from the beginning over the face of the waters and vexed the heart of man with unanswered questioning.

GEO. E. BELKNAP,
Captain U. S. Navy.

U. S. NAVY-YARD, PENSACOLA, FLA., 1st May, 1879.

CARTRIDGES FOR SMALL-ARMS.

THE PLEASURES ATTENDING THEIR MANUFACTURE.

AMERICA'S most successful military inventor, now resident in Paris, a man of vast experience and thorough good sense, said to me a few days ago, in Washington, "No living man can ever get me into cartridge manufacture again; I've had enough of it. Life is too short to worry over the forty-five ten hundred thousand millionth part of an inch. I am done with the business forever."

Few people who use fire-arms and metallic ammunition know anything of the worry and the annoyance of cartridge manufacture.

The cartridge manufacturer is adrift on a sea of troubles, with no land in sight, and only too happy if he can keep above the surface. His life is one of constant, never-ending annoyance. His waking moments are disturbed by the ever-varying and distracting conditions of the problematical cartridge. Even in his dreams he is tormented by that most horrible of all spectres, "the one-thousandth part of an inch," which, though always invisible to the naked eye, to him is as large as the Colossus of Rhodes.

And what, pray, is "the one-thousandth part of an inch"? And why is it necessary to worry so much over so small a matter?

When we purchase material sold by the yard, the knight of the yard-stick sometimes give us what he is pleased to term "good measure,"—that is, "throws in" a few inches more or less (generally less) than we are expected to pay for. This makes us think we are well treated, and determines us to accept the ever-cordial invitation to "call again."

It is not difficult to suppose a case where "good measure" would be anything but a kindness, and something "thrown in" would prove a positive injury.

If what we buy is to fit something we already have, and both are incapable of change of size, it is plain that we want just enough, and no more. Thus we "try on" our hats, shoes, etc., before purchasing, and why? Evidently that they may fit properly.

Let us now reverently approach the cartridge.

It, too, must fit, for it must properly fit the gun in which it is to be fired, and on the accuracy and uniformity with which both are made depend their character and efficiency.

Even in these hard times everybody is, or should be, a "greenbacker," to the extent, at least, of possessing some government promises to pay. These promises, till lately, exceedingly "thin," have always measured fully the three hundred and thirty-third part of an inch; split your greenback into three equal portions and you have made the acquaintance of that troublesome customer, "the one-thousandth part of an inch."

It is a small matter certainly, not worthy of much attention, yet if a cartridge is that much too large it will not go in the gun, and if too small may burst; and even if no other injury is done, *somebody's* heart must certainly break.

Thus is the partnership of gun and cartridge "limited," and thus is it quickly "dissolved" by the short-coming of either.

Guns must be made whose chambers do not vary by more than an infinitesimal quantity, and cartridges must be made of almost absolute uniformity. The maximum-sized cartridge must work in the minimum-sized gun, and the minimum cartridge in the maximum gun,—all easily, all perfectly.

Around the manufacture of both is thrown every safeguard, every check that human skill and ingenuity has been able to devise. In making cartridge shells the metal is carefully tested, anxiously watched, and rigidly inspected. The same care is exercised in the process of loading and inspecting. Much of this work is done by machines which lack only the power of speech to make one believe that they are intelligent, if not intellectual, beings.

Each and every cartridge is inspected and gauged,—is actually "weighed in the balance," and if "found wanting" is mercilessly rejected by machines of more than human accuracy, and totally without human "fear, favor, or affection."

Then why is there any trouble?

Because dies and punches wear; because of that miserable thousandth part of an inch. What to-day is of proper size, to-morrow will be either too large or too small.

A standard gauge of exactly the right size is changed by the warmth

of the hand, and thus are we prevented from touching anything, even "with a ten-foot pole."

I must confess to but little conservatism generally, yet I early saw the need of it in cartridge manufacture, for the reason that the slightest change in any one dimension may be attended with the most serious results. Therefore, actuated by truly patriotic motives, I unfurled my banner to the breeze, or rather pinned it to my desk,—this "banner with a strange device," which was, "Shoot the man that suggests a change!"

Thus should we "rather bear those ills we have than fly to others that we know not of." A thousand instances of the troubles daily met with might easily be cited. They would but serve as signboards on a dreary road, whose mile-stones only indicate our approach to "progress" far distant from "perfection," and whose many branches lead no one knows whither.

For the present let one suffice: at the Frankford Arsenal, Philadelphia, Pa., where the small-arm ammunition for the army is made.

Several years ago,—to be precise, I will say August 12, 1874,—a youth of some sixteen summers, whose duty it was to keep the shops supplied with powder, trundled along with his covered wheelbarrow, filled with boxes of powder, and soon arrived at the shop. Opening the cover, he took out the boxes of powder and placed them in a little coop, dignified by the name of magazine. Whether or not he was dreamily thinking of his "love of a shop-girl," must forever remain a mystery, but from some cause or other he upset one of the boxes, spilling a small portion of the powder on the ground. Fearing detection and consequent disgrace, he hastily collected the most of it with his hands and scattered the rest with his feet. This powder was used in the manufacture of rifle-ball cartridges, fifteen thousand of which were made on that unlucky day.

Several years afterwards an artillery officer at Plattsburg, N. Y., desiring some blank cartridges, and not having time for the "proper requisition," concluded to make them. He therefore, as if incited by the evil one, drew the bullets from some rifle cartridges made on the day before mentioned.

Guided by the "Deity of the Odd," he discovered in one of them "a most peculiar filling." This was promptly forwarded to the Chief of Ordnance, U.S.A., by him immediately sent to the commanding officer, Frankford Arsenal, "for report," and by him to your humble servant, to know "why is this thus?"

An examination readily revealed the nature of the "peculiar filling." It was found to be part musket powder, and—only think of it!—the rest was—anthracite coal and cinders!

How, in the name of goodness, could anthracite coal get into a Frankford Arsenal cartridge?

Be it remembered that the loading machine is carefully cleaned before commencing and after ending work four times a day, as carefully guarded while at work, and it will be readily perceived that the question was something of a conundrum.

For days everybody despaired of ever solving the problem, and many were ready to give it up. Fortunately, one day I watched the youth on his way to the shop, and, more fortunately still, the idea struck me,—"Suppose, on the 12th day of August, 1874, that miserable boy had upset his little wheelbarrow or one of the boxes, and had scraped up the powder along with some coal-dust and cinders."

As much delighted with the clue as would have been a New York detective, I approached the boy with "When was it that you spilled that box of powder, and gathered it up with your hands?" To which he replied, "It wasn't me, sir, it was the other boy who used to work here." "*Murder will out!*"

A careful examination of the ground revealed a few stray pieces of coal and cinders, and a full after-explanation of the occurrence developed the fact that the one cartridge opened must have contained all the coal-dust that had ever been put into a cartridge at the Frankford Arsenal. There was sufficient powder to give a good report, and no one could have told but what that cartridge was all right, had it not been, unfortunately, opened.

Who will tell me by the doctrine of chances, what earthly one there was that this cartridge, of the fifteen thousand made that day, the only one that had "a peculiar filling," should happen to be dissected in the manner described, more especially as its "manifest destiny," properly "fulfilled," necessitated its use as a "rifle-ball," and not as a "blank" cartridge?

The sequel is well told in Ordnance Notes No. LXXVIII., entitled "The Loading-Room Powder-Magazine at the Frankford Arsenal." That poor boy's occupation is forever gone, and never more will we hear of anthracite coal or cinders in any of our cartridges.

We are, however, confidently looking for other things to appear, and really there is no reason why, some day or other, in some cartridge or other, we should not discover some great prize, a thing we are sure never to do when we are expecting it. As a native philosopher aptly expresses it, "We never can entirely account for the total natural depravity of inanimate things."

E. M. WRIGHT,
Captain of Ordnance, U.S.A.

REFORM IN THE NAVY.

MANY years ago I made my first appearance on one of our ships-of-the-line, and was introduced into a mess largely composed of gray-headed passed midshipmen. During the early days of my novitiate I was frequently informed by the venerable Solons of the steerage that the service was going to—the other place; and was told that I had better "go home," "buy a farm," or "learn a trade." Nevertheless, I held on, and as time passed by and I advanced in rank, it began to dawn upon me that the navy was steadily improving.

As the memory of the war of '12 faded with the lapse of time, the remark that "we whipped the British in 1812, and could do it again," ceased to prevail; light began to break upon us; the feeble rays of educated intelligence to struggle out of the prejudices of sand and holystones, bright-work, and the "cats." The days when a loud voice and a strong stomach made a good officer ended, to be replaced by an era producing an equally brave, but a more highly-educated class.

The navy is under great obligations to Ward, Dahlgren, and Harwood, for the improvements which they brought about in ordnance, and for educating our officers up to the science of gunnery. Admiral Porter also has done much to help on the good cause. To his untiring interest in his profession, and his earnest desire to raise its standard, the navy undoubtedly owes much of what is now excellent in it. Besides what he has done to elevate its *personnel*, we have the Porter "quoin," "helmet," "cutlass," "torpedo-boat," and many other improvements from his fertile brain.

But while the outlook is most encouraging, it shows us at the same time that we are merely on the threshold of improvement. We are told by the admiral, and we all know, that our ships are insufficient. Therefore, to reform and perfect our navy we must begin by reforming our ships, for the latter is manifestly an essential prerequisite of the former. The first question to be considered then, is "How are we to get good ships?"

Primarily, we must have good material. Fortunately, we are well supplied in this respect. Next, we must have good designers. In these we are wofully deficient. I feel safe in saying that we have never had a highly-educated scientific naval constructor in the navy. Let it be

distinctly understood that I am not charging the naval constructors with any fault not inherent in the mode of their selection. Most, if not all, of them spent their youth serving an apprenticeship to the ship-building trade; hence, it follows that, while they may be first-rate ship-carpenters, they can rarely be scientific designers. If they were, the navy pay certainly would not keep them with us. Another serious objection to be made is their great, in some cases, absolute, ignorance of the sea. Thus it frequently happens that men who know next to nothing of the peculiar conditions of sea-life will design internal arrangements on board ship which are either inconvenient or unsuitable, and these are made permanent by a Bureau's order that no changes shall be made after leaving a dock-yard.

The law at present allows any graduated cadet engineer of the Naval Academy, who may be recommended, to be appointed an assistant naval constructor. By filling all vacancies in the construction corps from these graduates, a scientific class of constructors, or more properly, designers, would soon fill the list. They should be obliged to serve at least two years at sea, in order to learn some of the wants, trials, and discomforts of those they claim to know how to build ships for. They could then give us suitable vessels for any duty which might arise.

What "good ships for the navy" are, is an open question, but it seems safe to say that no vessel for *our* navy should be built that draws over ten feet at her load line. If this assertion seems radical, it must be borne in mind that the navy wants radical reform. We have no use for heavy and expensive frigates, while we do want vessels which can enter all our own ports, and which are not expensive to keep in running order. The late war taught us the value of light-draught vessels. The double-enders, which it was the fashion to decry, certainly had many faults, but they also had many virtues. Their faults were chiefly due to hasty construction, and were generally remediable. The writer commanded for nearly two years the "Tacony." Having planking three-quarters of an inch thicker than those built afterwards, she did not "knuckle"; her wind steering was almost entirely overcome by substituting manilla rope for wire as wheel-ropes; and familiarity with the fact that she was evidently determined to give each end its full share of being bow, enabled us to remedy another defect in her construction.

The duty to which the "Tacony" was assigned kept her continually in the sounds of North Carolina, with frequent passages over the bulkhead just inside of Hatteras Inlet, where there was rarely eleven feet of water. Consequently, she several times took the bottom not only there, but at many other places in the sounds, an occurrence which, with a flat-floored vessel, was a serious matter, often causing days of delay and fatiguing labor. Had the "Tacony" and her sister-vessels drawn but ten feet, they would have been much more efficient.

The "double-enders" got their bad character from being sent out as

cruisers, for which they were not intended, but they certainly performed their legitimate duties perfectly. Is not such a class of vessels of great value; armed with powerful batteries, and capable of being sent from Portland to Key West, always inland or with a harbor under their lee in which to take refuge from an approaching storm?

Of course it is not intended to advocate a navy of "double-enders" alone. No doubt our coming scientific corps of instructors will be able to give us sufficient stability, with ordnance and engine space adequate for all our wants, in a cruising vessel having but ten feet draught.

Never mind what English or French officers say. If our "cheese-boxes on a raft" teach them a great truth, let us glory in it. Let them build their heavy, over-weighted iron-clads to carry enormous guns, and send them here for us to blow up with our torpedoes, for the use of which our harbors are wonderfully well adapted.

The mirth of the French admiral at Montevideo did not stop the advance of our wonderful fleet of "Parker Veiners,"—three brigs and one light, rotten river-steamer,—sent to reduce the strong fort at Humaita and demand satisfaction from Paraguay, the republic which so long and so gallantly resisted the armies and iron-clads of Brazil. In this case, like the advance guard of a Chinese army, we threw somersaults and beat our gongs, and were fortunate enough, by the display of the most ludicrously wonderful naval force the world had ever seen, not only to succeed in our demands, but to escape the most humiliating defeat, if resistance had been offered. We underestimated the Paraguayans, as their struggle with Brazil subsequently proved, and sent to attack them a number of wretched coal steamers, *because they were light draught.*

Let us, therefore, now cut adrift from the traditions of the past, burn not only our ships but our books, and build some new *American* vessels, *but no heavy iron-plated cruisers.*

Having thus found good ships, the next question is, "How are we to find good officers for them?"

These are at present furnished by the Naval Academy, that institution sending out every year a highly-educated class of officers, who are fully equal to all the requirements of their profession. But the days of the sea officer, pure and simple, are numbered. In all the war-vessels of the future, of every type, steam will be, if not a vital element, a most necessary one. Engineers will consequently come to assume a more prominent position; and as they will have almost entire charge of the working of the vessel, they will assert the right to command, and certainly with a great show of justice. So the first thing to be done in the way of obtaining good officers is to settle, once for all, the question of rank.

As the Naval Academy is educating the rising generation, and is therefore responsible for making the engineers a highly scientific corps,

let it complete its work by giving an education which will enable all its graduates to fill any post and perform any duty required of them. Abolish a distinctive engineer corps, and let us all be *naval officers*.

At West Point the cadets go through the whole course, though after graduation they are assigned to different branches of the service, making specialties of them, while available in an emergency to perform any army duty; just as a practitioner of medicine can attend to a broken leg or bind up a wound in the absence of a surgeon.

Annapolis is rapidly improving the service, and when the day comes that the navy embraces the revenue marine, coast survey, and life-saving services, with no corps distinctions save the medical, and all shall be graduates of the Naval Academy, the rank question will be buried. The method by which this is to be brought about is simply to stop all new corps appointments and detail a graduate of Annapolis, as vacancies occur, to perform the duties of engineer, paymaster, marine officer, naval constructer, and civil engineer. The present staff-officers should be allowed to remain in the service and die out, in order to prevent injustice to them or shock to the naval system, as the old-time masters died out quietly.

On the same system of gradual absorption, the revenue marine service should be swallowed up by the navy. Its officers would thus gain an intimate knowledge of our harbors, and become familiar with the papers a vessel is required to carry and with our foreign treaties on the subject of commerce, all of which is now confined to the officers of the revenue marine. It is urged that naval officers would not like to serve under a collector of customs, he being a civilian, but that is a prejudice which would disappear in time. We have always served, without loss of dignity, under a civilian, in the person of the Secretary of the Navy, and in many cases under the Secretary of the Treasury and Superintendent of the Coast Survey.

The Coast Survey should belong directly and wholly to the navy, though a superintendent might be allowed from civil life, as at present. The officers and men of the navy now do all the hydrographic work, being temporarily transferred to the Treasury Department, though still paid by the navy, so that in this case no great change would be required.

Next is the life-saving service. The great objection, in the recent discussion on its proposed transfer to the navy, came from the revenue marine. Absorb the latter, and the life-saving service will naturally follow. The subject has recently been so fully discussed that it is not necessary to go over the ground again.

The light-house service should certainly belong to the navy. The duty of keeping the channels properly marked, all buoys and beacons in good order, and all lights bright, belongs, from the very nature of things, to the seafaring man. The position of keeper could advan-

tageously be filled by many of our retired warrant, or partially disabled petty officers.

The duties of light-house inspector are now performed by naval officers, while the Light-House Board is a mixed commission, in which the inevitable jealousies exist, clogging its wheels, and impairing its usefulness by a constant clashing of interests and authority. Under one head, all such evils would be gotten rid of, and by the employment of the officers and men of the navy the greatest of all drawbacks to its efficiency—the politicians—would be held more in check than they are now.

The tours of duty in the different branches should be, as at present, not more than three years, except in cases where genius is displayed in certain studies, which would be diverted, to the manifest injury of the service, by assigning the officer to some distasteful routine duty in accordance with an arbitrary regulation.

The proposed division of duties and change of tours among the graduates of the Naval Academy would, in time, cause a much better feeling to grow up among the officers, jealousies would die out, and a general knowledge of the profession be acquired, only those evincing particular interest in one branch being encouraged to become specialists. The abolition of all corps distinctions would also have a most beneficial effect in stopping, or very much restraining, the annual and injurious Congressional legislation, which grows out of our own complainings.

Another, and a most important, consideration is the fact that the consolidation of the different services would tend directly to economy, efficiency, and to unity of purpose.

One thing we should do is to burn up all books of allowance for stores and supplies. It would be instructive to fit out and send on the same cruise for three years two sister-ships,—one with all the extravagant allowance of spare gear, spars, and all the extra stores usually put on board, with orders never to purchase anything that she could draw from our foreign depots, the other supplied with everything to make her efficient, with orders to buy everything necessary to keep her so, and at the end of the cruise to compare expenses. The result would certainly show that a great saving could be made by the purchase of spars, rigging, provisions, etc., as wanted. In brief, why not, in the United States, supply immediate wants only, abolish our foreign naval store-houses, and purchase abroad as required?

Let us hope that some of these ideas may be adopted in time, and the *personnel* of the new navy now growing up may have a *material* navy suited to their recognized ability, and to the very liberal education which the government is giving them.

W. T. Truxtun,
Captain U.S.N.

THE BATTLE OF JANIKAU OR JANKOWITZ, 24TH FEBRUARY, O. S., 6TH MARCH, N. S., 1645.

"To this hero's honor, astounded
Europe still (1786) can witness bear."

Swedish Ode.

NAPOLEON BONAPARTE remarked on his way to Marengo in 1800, —after his finest campaigns of 1796–97 in Italy and his brilliant triumphs in Egypt and Syria,—that if he perished at this period, his career would not fill more than two or three pages of history. Indubitably true, for the career of a better man, a braver soldier, and a greater general than he is scarcely known to general readers. This superior "Feldherr," this hero, this "modern Hannibal,"—for so he has been styled by a military critic best capable of judging,—was Leonard Torstenson. This name in its signification is as grand as the exploits of its bearer. It means "the lion-hearted son or issue of the stone, or tower, of the Thunder-God"; and it was deserved. His soldiers named him "*Blixten*," and this sobriquet applied equally well to his management of artillery, the celerity of his movements, the suddenness of his appearance at, or seizure of, a key-point, the shattering effect of his victories, and the brilliant reputation he left behind him. Nelson was hailed as Duke of Bronte; but thunder is to lightning just about the same in degree as his influence upon the future is to that of the Swedish administrator of politics, logistics, and hostilities. Unsurpassed in intrepidity, this Swedish general's intellect to conceive and his energy to execute were only equaled by his courage. Schiller says that while his body was bound down with the fiercest of fetters, imposed by excruciating maladies, his enterprises had wings. His marches were so rapid that it is almost as impossible to account for their celerity as it has been difficult for experts to comprehend the means by which he fed and administered his armies. In a country "singed" and exhausted, he found food for his men and forage for their horses; and yet, amid the horrors of a war which had lasted twenty-four years, and was to drag on still thirteen years longer, in which

men surpassed fiends, and every possible crime stained the "*soldatesca*," from the baton of the field-marshal down through every grade to the partisan of the private, Torstenson lives, crowned with a reputation for humanity conceded by foes as well as lauded by friends; so much so, that Parival, in his "Iron Age," declares that "he dyed in the year 1650, and left a most excellent odour of his vertues everywhere, yea, even amongst his very Enemies themselves."

Probably he succeeded in accomplishing the miracle of feeding his troops by judicious economy and careful expenditure; by paying for what was absolutely needed; so that provisions which ran away from the conscienceless enemy flowed into him as they did to Wellington in Spain and France, and to Scott in Mexico, and away from the French as they have always done in nearly every country invaded by the latter.

This is a sufficient introduction for the hero. The present consideration relates to his crowning labor.

In 1635, Swedish affairs, which had attained such marvelous prosperity under Gustavus Adolphus, in 1631–32, had seemingly been wrecked under his principal successor, Bernard of Saxe-Weimar, at Nordlingen the first, in 1634. Restored at Wittstock, 1636, they had again ebbed until their very bed seemed dry. A new flood made southwards in 1641, when Torstenson, treading nature underfoot, appeared upon the scene. It seemed as if he realized the idea of Apelles, and in the litter of the invalid commander—his triumphal car—he carried with him the goddess of War with her hands pinioned behind her; or, to use the language of the German historian, Sporschil, he had subjected Fortune to his genius and experience,—in other words, Fortune, which had bowed all other conquerors to her yoke, had been rendered by Torstenson subservient to his intellect and intrepidity. Tamerlane when victorious over every enemy, boasted, "We have compelled Fortune herself to watch over the prosperity of our empire." Torstenson made this a reality in regard to the armies which his native Sweden intrusted to his charge.

Engaged in a mortal struggle with the Empire, menaced by the Muscovite, and scarcely delivered from a dangerous side struggle with Poland, impoverished Sweden had the sagacious temerity to anticipate additional hostilities with Denmark by a blow which paralyzed this rival kingdom. Torstenson was on the confines of Bohemia when, 13th September, 1643, he received an order to turn his arms against the "perfidious Dane." Like a phantom he vanished from the sight of his Imperial opponents, made a march of five hundred miles in fifteen days, and in six weeks was master of the Cymbric Peninsula. Gallas, the Imperial general, was ordered to follow him, unite with the Danes, and either "bottle up" Torstenson in Schleswig or crush him. Torstenson remade his army in Holstein, and "stripped the Danish goose of every feather." Nevertheless, it was said that the Imperialists, when they

appeared, did more real damage to the country in eight days than the Swedes had done in eight months.

By a series of manœuvres Torstenson laughed to scorn the conjoint generalship of the Danes and Imperialists, got between Gallas and his base, and simply "rubbed out" his army. Turenne is considered about as good a judge of war as any man who ever lived, and he has left on record an avowal and a eulogy which has scarcely a parallel. He wrote home to the French government, that "Torstenson had acquired all the reputation that a great man could obtain; that he ruined the Emperor's army by a series of operations resulting from great experience combined with masterly judgment associated with grand courage,—a result vastly superior to the mere winning of a battle."

The Emperor was now left without an organized army, and, it might be said, with only one general to which—if he had one—he could confide this army. By means which only despots can employ, the Imperial administration swept together what has been termed "its last army." This expression doubtless means its last army of reliable troops. Field-Marshal-Lieutenant Goetze, who was defending the southeastern frontier against the Transylvanians, abandoned his charge and hurried back to Prague. The Elector of Bavaria loaned seven thousand veterans under the renowned Field-Marshal Mercy, and scarcely less celebrated Field-Marshal-Lieutenant Werth; the apostate Elector of Saxony sent a strong contingent, so that by the time that Torstenson got ready to make a fresh move, about thirty thousand veterans were assembled to meet him, under Field-Marshal Hatzfeld, an exceedingly capable but a most unlucky commander, whom Torstenson had helped Banér to "whip out of his boots" at Wittstock, 24th September, 1636. Torstenson's final body-blows against Gallas around Magdeburg had been delivered in the last days of 1644. In January, 1645, the Swedish generalissimo had his headquarters at Zeitz, twenty-three miles southwest of Leipsic, in Saxony, and had at his disposal for active operations, everywhere, less than thirty (perhaps not more than twenty-five) thousand men, with eighty pieces of artillery, harnessed and horsed. In midwinter he crossed the Ore (Erzgebirge) and Pine (Fichtelgebirge) Mountains,[1] which separate Saxony from Bohemia, and by the middle

[1] Bonaparte crossed the Great St. Bernard by a regular route (pass 8150 feet above sea-level), after every preparation had been made to facilitate the transit, and at a favorable season,—the end of May, 1800. Macdonald had a harder nut to crack. He moved in (end) November–(beginning) December same year by the Via Mala, a road from time immemorial, over the Splügen (Rhætian Alps), 6939 feet above sea-level. He had all the advantages of more than a century and a half's developments in every branch of the military art and science, as well as of all kinds of improvements in the practical industries applicable to war. Torstenson crossed the Erzgebirge, average 2500 (Schwarzwald 4500) feet above sea-level, by passes higher than our Catskill Mountain House, which, as a rule, is often *inaccessible* in ordinary winters, and the Fichtelgebirge, farther westward, 3397–3450 feet, with the help of only improvised means gleaned from an ever poor and now exhausted country, at

of February, 1645, was in the heart of the latter kingdom, and in the presence of his adversary. In comparison to this feat of audacious generalship at this epoch of time, and at a period of the year when the only reliable bridge was the ice, when the best of roads were not practicable and buried in snow, and when, in most places, there were no roads at all, Bonaparte's transit over the St. Bernard in May, 1800, was a holiday promenade; and Macdonald's passage of the Splügen in November–December of the same year, a severe but not unparalleled winter march.

Near Horazdiowitz, on the Wottawa, an affluent of the Moldau, which latter flows past Prague, about seventy miles south-southwest of the Czsechish capital, the opposing armies first saluted each other with a few cannon-shots. Here ensued parallel flank marches down this river (the Swedes along the left, the Imperialists along the right bank), of which there are no other exact examples except those of Marmont and Wellington along the Guarena, prior to Salamanca, in the summer of 1812. The two armies "talked with each other throughout the day with their pieces," says the Swedish report,—that is, exchanged cannonades wherever the ground was favorable to the posting of artillery. By mountain-paths "never before traversed by any species of wheeled conveyance," Torstenson reached Klokonitz on the Moldau. He had now thrown Hatzfeld sufficiently off his track to gain time to cross this river. His cavalry, artillery, and equipages got through by a shallow ford, and some miles farther down his infantry upon the ice. Torstenson's opponent had been hitherto completely at a loss to comprehend his real objective. At first he thought the Swede was bound southwest for the Pfalz or Upper Palatinate to renew the Gothic invasions of Gustavus, Saxe-Weimar, and Banér, and then again that his goal lay due south, and his intention was to excite an uprising of the persecuted Protestants of Upper Austria in the circle of the Enns. As soon, however, as Torstenson demonstrated by wheeling the head of his columns to the right, Hatzfeld became satisfied that his great opponent's primary plan was the relief of blockaded Olmütz, one of the last two fortresses still held by the Swedes, two links still intact out of the long chain of strongholds which had connected their operations towards the Danube with their base, in Pomerania, on the Baltic.

In turn Hatzfeld now crossed the Moldau, marched to Mülhausen, and stripped his army, so to speak, of every incumbrance not absolutely necessary. He left his baggage behind in the country around Tabor, and dispatched two hundred picked horsemen under a distinguished cavalry officer, Colonel Sporck, to observe the march of the Swedes.

a time when locomotion was almost in its infancy, and hygiene an unknown quantity. The only just comparison to Torstenson's passage through the Saxon Switzerland would be Suwarrow's mad-cap forcing of his way (after overcoming the St. Gothard) through Eastern Switzerland proper, in September–October, 1799.

A large number of orderlies, or couriers, and messengers were furnished to Sporck, to enable him to send in reports from time to time; and, that his intelligence should not miss his superior, he was provided with a time-table stating where Hatzfeld was to be found from hour to hour. Sporck performed this duty with so much ability that the two armies came in sight of each other, the Swedes on the heights northwest, and the Imperialists on the ridges southeast of Jankow, about ten miles south-southwest of Czaslau or Chotusitz, where Frederick the Great defeated the Austrians in 1742.

Although Sporck was watching for the Swedes, the grand conflict was nevertheless, in a great measure, like that of Gettysburg, unexpected or accidental. It was precipitated, like the collision of the first day of Gettysburg, by the sudden appearance of the Swedish horse issuing from the woods, just as Buford's division of cavalry moved out of Gettysburg, to the astonishment of the rebels; or, to put it more closely and clearly, the first collision resembled the stumbling of Buford's division into Fairfield at dawn of the day preceding Gettysburg, when the Union troopers, descending the South Mountain through the Monterey Pass, ran into a detachment of Pettigrew's division, and both parties recoiled, not knowing what was in front or in support, and fell back upon their main columns.

This encounter was likewise not unlike Pleasonton's, or rather Gregg's, first meeting with the rebel cavalry over to the right and northeast of Gettysburg, at Hanover Junction, where neither expected so speedy or dislocated a collision.

Both armies immediately formed lines of battle on high ridges about a mile apart. Janikau, or Jankow, situated on lower ground, lay between them, and was of no benefit to either. There is a vast discrepancy in the different accounts of the forces in presence. A great authority, the Prussian "History of Everything appertaining to War" [1838], says (i., iv., p. 361) that each army numbered between twenty-four and twenty-eight thousand men; but that the Imperialists were stronger by three thousand in cavalry. A close calculation, however, of the units of force in presence furnishes a result which disagrees with this. The majority of historical writers conclude that the Swedes had only about sixteen thousand and the Imperialists about nineteen thousand. In artillery, the advantage was entirely with the Swedes. The Imperialists had only twenty-six pieces of field-artillery, whereas the Swedes, between regular field and light regimental guns, had certainly twice if not three times as many.

It is generally conceded that among the most generally known and comprehended battles of the modern world those of the Leipsic (1631) of Gustavus and the Leuthen (1757) of Frederick the Great are most frequently cited. Napoleon never fought a *preconceived* pitched battle comparable to either of these, which are absolute patterns for the dis-

posing and handling of troops, according to circumstances, under fire.

There is another battle, however, which is scarcely known even to soldiers who are close students, nay, is almost unknown out of Germany. This a careful critic has pronounced to be the finest, perhaps, of the Thirty Years' War, and it is to be regretted that it is one of the battles which (for the advancement of military art and science), up to the present time (1838 date of work), have been the least studied.

It has been remarked that while the victorious career of Gustavus Adolphus was founded on fixed principles and gradual development of talent by experience, the operations of his favorite pupils were *impromptus,—i.e.*, strokes of genius. This judgment is somewhat unfounded or incorrect as regards Torstenson,—the "Modern Hannibal." This title is applicable to the Swede in almost every sense. His forces, like those of the greatest Carthaginian, were chiefly composed of foreign mercenaries, and had to be remade almost with every new campaign. It was Torstenson's extraordinary influence over the foreign soldiery and discordant elements composing the armies which acknowledged the authority of his queen, Christina, that made the Swedish Regency deaf for years to his pressing petitions for a successor. It was not until acute disease rendered imperative the acceptance of his resignation that he was allowed to retire. Even then he was constantly engaged in reconciling difficulties and accommodating quarrels which never occurred while he was at the helm. What neither Frederick nor Napoleon did accomplish effectually, Torstenson achieved. In his sick-chamber he planned the movements of his successor, indicating the course of campaigns, and remained the intelligent source of all the inspiration which finally brought this terrible struggle throughout more than a generation to a successful issue in favor of his creed and his country. The fact is, Torstenson is the only man, so far investigated, who could tell others, when acting beyond his supervision, what they had to do, and through orders have this well done; while he himself could accomplish whatever the Swedish government desired him to do, and always faultlessly. Frederick was not up to such "playing chess blindfold," nor was Napoleon. To use the language of the biographer of his successor, "Wrangel was substituted for Torstenson in Germany, whose advice he nevertheless followed with deference."

No man ever carried on war more methodically than Torstenson, but there was a genius in his method which made it seem very often superhuman. What sometimes appeared like madness to ordinary minds was pregnant with the soundest and highest degree of sense.

His very return to the massed formations styled "Terzias," or "Tercios," which Gustavus Adolphus condemned, may have been most judicious. It is most probable that he did so because he found that the comparatively mobile, shallow deployments of his great master, with

the disappearance of the latter's veterans and thoroughly-drilled levies, were ineffectual to resist enterprising cavalry,—an arm which usually constituted the majority of an army at this era.

Fire-arms acquired very little development or improvement during the Thirty Years' War, and were not provided with bayonets. These, "the cold steel" of infantry, were not introduced until half a century afterwards. Consequently, pikes or spears under different names and forms were the only defensive weapons of footmen against cavalry. In 1645, these lines, composed of young recruits or fresh levies, firing slowly and badly, and not strong in pikes, could not be relied on against an audacious aggressive. Experience demonstrated they were not steady enough to resist such superior cavalry as existed, except in dense and solid formations. In order to comprehend this, recollect that the mass of a brigade, or demi-brigade, or regimental terzia were pike-men. These constituted the square or main body of the living or moving fortress, at whose corners the musketeers, formed in smaller squares, were often posted, like flanking towers, exactly upon the plan of the old Burgundian castellated mansions and Swiss strongholds[2] prior to the general introduction of artillery.

Consequently, Torstenson's return to tactical formations which Gustavus had superseded was no retrograde in military dispositions or tactics, but doubtless the result of observation, prudence, experience, and necessity.

The battle of Janikau bears a much better resemblance than any other to Frederick's famous battle of Leuthen, or Lissa, 1757, because there was a tactico-strategical key-point to either field, which, in both cases, lay on the Austrian left. The acquisition or occupation of this may be said to have decided the fate of the day. In few battles that have occurred has there ever been so much manœuvring. Both sides formed three, the Austrians four or five, lines of battle, on totally different fronts and ground; so that, whereas they originally faced each other,—the Swedes fronting southeast, the Imperialists, Bavarians, and Saxons northwest, Janikau half-way between,—they were finally so disposed that they seemed to have changed places, and stood at almost right angles to their original facings.

Pitched battles have been compared to duels, and if ever such a simile would seem to be justified it was undoubtedly so in the case of Janikau. The two generals were absolutely compelled to fight. Mercy, the commander of the Bavarian contingent, assured Hatzfeld, in positive terms, that if he did not engage within three days, he would have to lead his troops home to defend his own country from the French.

[2] "The streets of Tokio were crowded with a motley throng up to the very gates of the citadel, where, within the first moat, stand all the *yashgis*, or residences, of the Daimios. Each *yashgi* is surrounded by a blank wall, loop-holed, and with a tower at each of the four corners."—"*Around the World in the Yacht 'Sunbeam.'*" By Mrs. Brassy. New York Society Library.

This, with the even more positive orders to Hatzfeld himself from the Emperor, who had been assured of a miraculous victory by the Virgin in a dream, left him no discretion.

On the other hand, Torstenson had called all his generals and colonels to a council of war, and after mature deliberation they unanimously voted "in God's name to attack." In this opinion all the other officers and even the soldiers heartily concurred. Harassed and impeded by the enemy by day and night, compelled to bivouac in the severest winter weather without the slightest shelter, while short of provisions and forage, all agreed, from chiefs to privates, that if the impending battle was postponed, the troops would soon be in no condition to fight to advantage.

In his arrangements for this battle, Torstenson drew up his army, as far as the locality would admit of a continuous or regular line of battle, in two lines without any reserves. Six infantry regiments formed according to the favorite tactics of the enemy [the Imperialists], in *Tertias*, constituted the centre of the first line; two other regiments, drawn up in the same manner, were posted in the second line, in the rear of, covering the intervals between the two regiments on either wing of the centre; while thirteen regiments of cavalry in two lines composed his right, and as many his left, wing. All these regiments except five, undivided, and one, divided into three, were broken into two distinct subdivisions; while in every interval between those in the first line were posted forty "commanded" (picked) musketeers.[3] The artillery appears to have been placed and served as circumstances required. The light artillery or regimental pieces, according to the three different contemporaneous plans of this battle, appear to have been shifted as occasion required to every quarter of the field, and often followed the "commanded" musketeers acting as skirmishers. In the representation of the course of this battle, these light guns are shown to the right and left as well as in front of the Imperialists, and the heavier pieces on an eminence, shooting over the heads of the Swedish main line of battle. The Swedes, nevertheless, according to Von Lundblad, could not be said to have had a connected line of battle. Arwid Wittenberg, who so gallantly led the same wing of the Swedish army at the battle of Breitenfeld (Leipsic second, 1642), commanded the right wing; Robert Douglas, a Scotchman,—the ancestor of the family of that name, even now existing in Sweden,—the left; the infantry (centre) were marshaled

[3] Upon reflection it seems probable that the culling out of picked marksmen styled "commanded" musketeers, under selected officers, may have been the dawn of sharpshooters, as the night of military art and science was about to be illumined by the rise of such lights as Maurice of Nassau and Gustavus Adolphus, and the latter's regimental pieces, as a slight indication of the comprehension of the usefulness of pieces adapted to all circumstances, such as the mobilized 12-pounders or Napoleon guns of the great American contest.

under Caspar Cornelius Mortaigne. He was a noble leader, who possessed the confidence of all his brother officers and soldiers, and at Breitenfeld shared with the lamented Liljehok the conduct, on that occasion as on the present, of the centre. The watch-word of the Swedes was, "Help, Jesus!" "The help of God" had been the war-cry of Judas, like Charles Martel, styled Maccabæus (Makke-baiah, (the Hammerer?), a Conqueror in the Lord), perhaps, after Joab, the greatest general in Jewish history.

The formation of the Imperial army was very similar. The centre, however, consisted of but one line of infantry, formed in six great *Tertias*, of which the Bavarian Electorate troops constituted the right centre, Goetze's infantry the left. In the second line, centre, stood the Saxon Electorate troops (cavalry), broken up into seven small divisions, in the rear of, covering every interval between, the *Tertias*, and also the first squadron of each of the wings. Ten (twelve?) regiments of cavalry, in two lines, formed the left wing proper, and nine also, in two lines, the right wing. At the utmost extremity of the left wing (proper) two regiments were posted, in such a manner that they stood immediately in the rear of the flanking regiments of the first line; the second (cavalry) line was drawn up considerably farther to the rear, on a prolongation of the alignment with the Saxon Electorate cavalry of the centre (second line). The artillery, twenty-six guns, was posted according to circumstances. Count Melchior von Hatzfeld, commander-in-chief, supervised the whole, and was everywhere that his presence seemed to him necessary. Johann von Goetze commanded the left wing; Caspar von Mercy and Johann von Werth the right; the Count Suis [Suys] and Don Felix the centre. As his watch-word Hatzfeld had selected the war-cry of the savage, "No Quarter." This drew down upon his troops the extremity of retaliation, for the Swedes were well aware that cut off and surrounded, alone in the very midst of their enemies, their fate, if conquered, was to be extermination. As conquerors, they returned the fatal chalice to the lips of their opponents, and Hatzfeld himself narrowly escaped the draught his malignity prepared for others.

Hatzfeld was a very accomplished, experienced, and capable, as well as valiant, leader, but bigoted and unlucky. His dispositions were faultless, but his execution was neutralized by a condition of things over which he had no positive, and too often no influential, control. Similar causes to those at work in his "armada" militated against the harmonious working of the Union army, in which corps, and even divisions, were commanded by officers of the same grade with the general-in-chief. Field-Marshal Hatzfeld, besides other lieutenants of high rank, had under him four field-marshals, all of whom had distinguished themselves on several occasions, in command of independent armies, and therefore considered themselves as capable of judging what was

expedient as their superior for the time being. The chief received about as general hearty support as Pope, whereas his great opponent was seconded, heart and soul, by every one, from highest to lowest, and, like George H. Thomas, our greatest and our best, was beloved, as well as respected, by all.

As far as can be made out, Hatzfeld was a full field-marshal, but, although he calls Goetze a field-marshal, the latter was only a field-marshal-lieutenant. Mercy and Bruay had the same rank; likewise, most probably, Werth. From close investigation it would appear that Werth was not a full field-marshal until afterwards. He is styled, it is true, by some a field-marshal at Tuttlingen in 1643, but other authorities say he was "general of cavalry." The British military biographer and annalist, General Cust, pronounces him the best cavalry commander of this century of war. Don Felix was a major-general. As to Count Suys, no rank is given, but he was greatly esteemed.[4]

On the Swedish side, Arwid Wittenberg seems to have held the position of Feldzeugmeister, or general-in-chief of the ordnance or artillery;[5] Douglas had been promoted from a colonelcy to a major-generalship only a short time before the battle, and Mortaigne was also a General-Wachtmeister,—*i.e.*, major-general.

In regard to the characteristics and acknowledged standing of the most prominent officers on this field, the first were striking, it might be said grand, and the latter very high. Torstenson stood without a superior. He was "*invictus*." From his first appearance in arms as the "Body Squire," or Armor Bearer of Gustavus, which implies the office of confidential aid-de-camp, he had displayed astonishing capacity.

Of all the great commanders of which the seventeenth century was so prolific,—and the same remark may be extended, with a few wonderful exceptions, over the whole period of history,—only three generals (according to Puffendorf, Voltaire), Gustavus, Torstenson, and Condé, exhibited at the age of twenty years all the maturity which in other men results from experience.[6]

[4] It is very curious that almost all the Imperial generals had been soundly thrashed, at one time or another, by Torstenson; Hatzfeld at Wittstock (1636), where he was second in command to Banér; Bruay and Suys at Breitenfeld or Leipsic second (1642), where he commanded in chief. These were now again before him. The Archduke, Leopold William, and Piccolomini had been worsted by him on various fields. And so on with pretty much every one of the others.

[5] Duckett says this title, in the Austrian and Bavarian services, signified sometimes a general of infantry, sometimes of cavalry, and sometimes of artillery, and that, in Austria, this puzzling grade was intermediate between that of a full field-marshal and a field-marshal-lieutenant.

[6] During an engagement in this Riga campaign (1621 ?), says the Swedish historian Fryxell, Gustavus Adolphus dispatched Torstenson with verbal orders to one of his colonels, an officer, even now in Europe, enjoying a higher command than one of our brigadiers, and two hundred and fifty years ago holding a still more important relative position. As Torstenson, aged about eighteen, rode along,

Torstenson, when compared even with Gustavus, was greater as an executive and administrator. In every respect he was vastly superior to Condé, who would have wasted such an army as that of the Swede —which could neither be replaced from a sparsely populated and exhausted recruiting district, such as his native country, nor from almost depopulated Protestant Germany—in a single battle, as was the case, in 1644, at Freyburg.

In almost his first battle, Torstenson displayed extraordinary comprehension and foresight, and made dispositions which jeopardized his head, but won the victory. Gustavus wrote, in 1632, to Oxenstiern (as quoted by Loccenius), "I know him to be the very man who is especially qualified to command the whole army." Of him it might almost, indeed, be said, to use the language of the Bible (Judith xi. 8), "For we have heard of thy wisdom and thy policies, and it is reported in all the earth, that thou only art excellent (*in favor*) in all the kingdom, and mighty in knowledge and wonderful in feats of war."

Experts concede that this hero was the "chief of the three mighties" who successively succeeded Gustavus, and that he was very far superior to his own successor, Wrangel, who was little more than a weapon in his hands. His comprehension of the advantages of massed batteries and the general power of artillery has never been equaled. He managed it, to use an expression attributed to Napoleon, "like a (giant's) pocket-pistol"; or, rather, as an experienced swordsman, who is a perfect master of his weapon, handles his rapier; and when he quitted the army in 1646, Geijer says that the enemy (of his country) rejoiced, supposing that Torstenson's cannon were now silenced, and valued his removal from the army as equal to a loss of ten thousand men for the Swedes. This simile has been applied to several generals in the course of military history, but was originally used (2 Samuel xviii. 3) in regard to their soldier-sovereign, David, by the army which annihilated that of Absalom in the wood of Ephraim, B.C. 1023.

In the case of Torstenson it was equivalent to saying that his leaving the field involved the elimination of an army-quantity from the war

he discovered that the enemy had made a change in his position, and that the movement prescribed in his orders would be dangerous to the Swedish troops affected by it. Accordingly, instead of delivering the king's order, he substituted commands of his own in the king's name. When he reported back to his sovereign, Gustavus bade him ride swiftly back again with new orders, based on the enemy's changed dispositions, and charged him with directions exactly equivalent to those which Torstenson himself had given on his own responsibility. Torstenson thereupon begged pardon, and confessed what he had done. Gustavus looked on him and said, smiling, "Torstenson, you are better fitted for a commander than for a (squire of the body) page." According to Schiller, Gustavus menaced him with his hand, with the words, "Torstenson, that might have cost you your head; but I see in you a good general!" That night he was commanded to sit by the king's side at the supper-table, and from this hour he enjoyed the king's friendship and particular attention.

problem; for more than once at this period ten thousand veterans decided the fate of a country and a campaign. His lieutenants were each one equal to any of Napoleon's marshals, and as renowned in their day. They had profited more than the latter by long experience in the field, and possessed more tactical ability, especially under fire.

Major-General Mitchell, B.A., author of "The Fall of Napoleon," "Life of Wallenstein," "Eminent Soldiers," etc., makes a remark equivalent to this, and in a lesser degree it is equally applicable to several of Hatzfeld's subordinates.

Of these latter Mercy, in his day, ranked with Turenne and Montecucoli. Werth, as a partisan and cavalry commander, was almost equal to the Swedish Königsmark who ended the Thirty Years' War by the surprise of Prague. Suys or Suis was a trustworthy veteran, especially skilled in the direction of ordnance; and Goetze was a sort of headlong Davoust or ruthless Vandamme.

"As true a dog as ever fought at head."

Goetze might have used in regard to himself the very words of Aaron, in "Titus Andronicus,"—

"For I must talk of murders, rapes, and massacres,
Acts of black night, abominable deeds,
Complots of mischief, treason, villainies,
Ruthful to hear, yet piteously perform'd."

Thus, while he was a fearless but willful soldier, his memory is stained with one of the blackest deeds of the most terrible of all wars (that of the Thirty Years),—the Pasewalk massacre in 1630.

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As previously stated, when the Swedish and Imperial armies first formed line of battle on the afternoon of the 23d February, O. S., the former faced southeast and the latter northwest. Midway between them was the market-town of Janikau, about three miles (Ger., 14–15 Engh.) north-northeast of Thabor, and southwest of Czaslau, where "blind" Ziska, the Hussite hero, was buried and Frederick the Great won, on 17th May, 1742, a great victory over the Austrians, better known as Chotusitz. There was skirmishing during the afternoon and evening, and the Imperialists threw forward some guns, which annoyed the Swedish troopers, who were compelled from scarcity or inaccessibility of water to lead their horses down to slake their thirst at a stream, or pond, or lakelet between the two armies. Upon reconnoitering the country, Torstenson recognized that the key-point of the fighting-ground in this immediate locality was a height crowned by a chapel, which corresponded to the elevations at Sägschutz at Lissa (1757), the hill of Siptitz at Torgau (1760), and the Round Tops at Gettysburg, which constituted the tactico-strategical key-points of all these fields.

There was just such a point at Antietam, obliquely in advance and to the right of the Union right wing, from which vantage-ground the rebel lines might have been enfiladed and cleaned out by the Union artillery if it had been posted thereon.

As soon as Torstenson's eagle-glance discerned this key-point, he bent all his energies to deceiving the enemy, while he inaugurated a series of masterly manœuvres to get possession of it.

These preliminary moves, in many respects, are not dissimilar to those of Hooker, by which this commander circumvented Lee, and attracted his attention to Sedgwick's corps, while he threw the rest of the Army of the Potomac across the Rappahannock and around to the rear of the Army of Northern Virginia.

Torstenson gained his objective and a position which commanded the field by an admirable flank march, which is perfectly shown on the contemporaneous plan. This very much resembled Hooker's movements prior to Chancellorsville and Stonewall Jackson's flank march, which enabled him to strike the Union position in flull flank and partly in reverse. It was also similar to Ibrahim Pasha's flank march around the Turkish army in position at Nezib, 24th June, 1839. Frederick's oblique march at Leuthen was somewhat similar. Torstenson's manœuvres, however, furnish the finest examples on record, because they succeeded in spite of the enemy's watchfulness and attempts to anticipate his intentions. Torstenson not only succeeded in acquiring the key-point, but compelled his opponents to conform their dispositions to his own,—partly by this filing off by the right, and partly by a wide conversion, which shook them up so thoroughly that they were not able at any time afterward to completely readjust themselves.

During the night (23d–24th) Torstenson shuffled his brigades as if he were going to occupy a range of hills to his front, and made a great noise moving his trains and artillery. Twice, likewise, after midnight, the Swedish trumpeters sounded To horse,—"*Butassella.*" Subsequently, again Torstenson made movements as if he were about to attack the Imperial right. Hatzfeld knew Torstenson well enough to comprehend that all these demonstrations were made to conceal his real intentions, and that his objective was not the point indicated by these demonstrations, but the contrary. Accordingly, Hatzfeld ordered Goetze to reconnoitre closely from his left, and especially to occupy the chapel on the height. The next morning (24th) the Swedish army appeared to be falling back in order to take up an elevated position in the midst of woods and underbrush, as if it was about to retreat upon the same road by which it had come up. Meanwhile, and simultaneously, as soon as it was light, Torstenson filed off by the right, and by a circuitous flank march, his cavalry (equivalent to mounted infantry) leading, made himself master of the height, crowned by the chapel so often referred to, situated to the right and southeast of Janikau, which gave

him the complete command of the surrounding valleys. On the other hand, Goetze, instead of obeying his chief, postponed any movement until late next morning (24th). Then, when he did move, over a very difficult country, and upon dubious wood roads, he found the chapel and height occupied by the Swedes. It would seem, from the original plan, that the Swedes formed their original lines of battle for actually engaging on a ridge north of the chapel, with their left anchored on it. This compelled Hatzfeld to establish a new line by filing off by his left or by a complete half-wheel, so that this, his new and second line of battle, was almost at right angles to his first one on the evening previous, the 23d.

In the desperate engagement which ensued, commencing, some authorities say, as early as seven o'clock A.M., others at eight, the Imperialists, caught in a perfect trap, were exposed to a plunging fire, and either slaughtered or put to flight and scattered. Goetze himself lost his life like a fool, "that a little time before thought he might command the waves of the sea (so proud was he beyond the condition of men)." Such was the popular estimate of his indiscreet excess of courage and conceit, that, to this day, the Bohemians, in speaking of an imprudent adventurer, quote as a proverb, "He will do as little as Goetze near Janikau."

The first battle was over long before noon, and there is a little uncertainty as to what were the plans of the Swedish commander for his next move.[7] He had shattered to pieces the Imperial left, and the rest of Hatzfeld's forces had abandoned in confusion the position assumed for their first line of battle. Whatever were the intentions of Torstenson, circumstances, locality, and the success of the morning determined that the matter should be fought out then and there. The Swedish generalissimo may have thought that it was most unwise to arrest the impulse of victory and put off till the morrow what could be accomplished at the moment.

Frederick the Great has been severely criticised for not having been content with his morning success at Kunnersdorf. There, however, as

[7] In some respect or particulars this battle of Janikau resembles that of Dunbar. As Cromwell wrote to the Governor of Newcastle, "We are upon an engagement very difficult. The enemy hath blocked up our way at the pass at Copperspath, through which we cannot get without almost a miracle. *He lieth so upon the hills*, that we know not how to come that way without great difficulty, and our lying here clearly consumeth our men, who fall sick beyond imagination." (Page 88, Guizot's Cromwell.)

Even Cromwell despaired under these circumstances; but there is no record or evidence that Torstenson ever even desponded. With reference to Cromwell's expression, "he lieth so upon the hills," it is stated (Cust's Warriors, 1600–18, ii. 424) that Hatzfeld had every advantage of position, because the heights which he successively occupied rose higher and higher as he fell back, in the form of terraces or steps, which rendered the attacks of the Swedes upon him extremely and increasingly difficult.

at Monmouth Court-House, the overpowering sultriness of the day was an important quantity in the battle problem. The contrary was exactly the case at Janikau, and everything concurred to prompt in hallooing on the dogs of war and in justifying the expression,—

"Let's take the instant by the forward top,"

and, obeying the pregnant battle counsel of Hastings, in the revolt against Henry IV., about 1404,—

"We are Time's subjects, and Time bids begone."

In veritable fact the low temperature of this day was a blessing to the Swedes, since, by freezing the surface soil, it tended to facilitate their march, and was favorable to the health of their generalissimo, permitting him to visit on horseback, or in a litter, every position which required his supervision, and at the moment when the danger was imminent. Remember, Torstenson was a perfect martyr to the gout and gravel, and, as a rule, could use neither his hands nor feet. Immediately after the battle, when rainy weather succeeded the cold spell, he fell sick again. One day earlier, such an accident might have changed the whole fortune, not only of the day, but of the war, and occasioned the destruction of the Swedish army.

It is, indeed, almost impossible to give an appreciable idea of the broken character of the country. Torstenson, in his report, says the stage of this battle was so rough and wooded that it was impossible to form a continuous or regular line of battle. A bird's-eye view explains this fact, and reveals as difficult a district as any in which the most important battles of the great American conflict occurred except the "Wilderness," so that a great many subordinate movements were hidden by the trees, and only indicated by the smoke and reports of the artillery and small-arms. To such a degree was this the case that Hatzfeld himself—captured toward the close of the conflict—was taken among the bushes, in which he had lost himself, at a spot which was, nevertheless, almost central to the action. The fact is, the fighting was continuous, but in volume resembled the section of an hour-glass or figure 8; and the partial engagement at noon, which, after all, had the most important influence upon the result, would be fitly represented by the narrow connecting neck.

It has been often stated and generally believed that skirmishing, as it is understood at the present day, is not much older than a century. This is a great mistake. Skirmish practice was assiduously taught to the Swedish troops, certainly to "the Guards," as soon as, if not previous to, their setting foot on German soil; and the skirmish-lines were stiffened with the light regimental guns, which could accompany the

movement of infantry everywhere, and which were drawn by one horse and served by only one or two men, often selected for the purpose from the infantry. These guns, as a rule, discharged cartridge-shot, or grape, or canister, and, from the little that we know of them, may have resembled mountain howitzers (in their service at least). It is certain that conical chambers, by some considered a comparatively recent invention, had been introduced more than two hundred and fifty years ago. At Janikau these regimental guns were planted wherever the ground presented a favorable position, and are represented as pouring in a concentric fire upon the enemy. They were pushed out as audaciously as Oswald's American guns in the morning's battle at Freehold or Monmouth Court-House, 1778, or the rebel battery which dashed on ahead of the rebel skirmish-line on the second day of Gettysburg, and poured an enfilading fire into the teeth of Humphreys' command,—the Second Division, Third Corps.

After the Imperial left wing had been defeated, losing a "field-serpent" (6-, or 8-, or 12-pounder) and eight small pieces, likewise "almost the whole ammunition, except the balls of the Imperial (artillery) army," and Hatzfeld was withdrawing the remainder of his troops to the new position selected by him, smart skirmishing continued. Torstenson's "commanded" or selected musketeers and some light regimental pieces ran and rattled forward, and a very sharp little fight occurred in the woods to the left of the defile in which Goetze had been killed. In this the Swedes had the worst of it, because they expected to encounter only a slight rear-guard, and ran into the mass of the enemy. Here they lost three of their light pieces and a number of rallying-colors, and several of more importance. The Imperialists, however, do not appear to have profited by this temporary advantage, and continued to fall back until they formed an entirely new line of battle. This was not accomplished without great disorder.

Not to weary with details, the Imperialists finally stood fast upon a ridge from which the ground sloped gradually from them, forwards, like a glacis. This, with other favoring circumstances of the locality, had induced Hatzfeld, according to his report, to advance his forces to this point from a ridge farther to the rear, where it had originally settled down into some order. Hatzfeld did so because the new disposition afforded him better opportunities to carry out his plan for the decisive struggle in the afternoon.

The Imperial right now leaned on Janikau, its left on a village, which was set on fire, according to the barbarous usage of the times, to prevent its being outflanked in this quarter. The second battle began about (after) twelve o'clock, and was not completely terminated until dusk. The Swedes advanced with a convex line of battle,—the first formation adopted by Hannibal at Cannæ,—and the Imperialists received them with a concave line. As the latter were superior in force by

three thousand cavalry, they overlapped the Swedish right, which gave them an advantage. This nearly proved fatal to the Swedes, since it enabled the Bavarians to get in their rear, as will be seen, and cut in upon the reserve train and baggage. This is exactly shown in the fourth plate of the battle, in the "Theatrum Europeum." A similar state of affairs is displayed in James Walker's wonderful picture of the first day at Gettysburg, in which the vast crescent of rebels seems about to envelop the little resisting force of Unionists.

All the accounts are now as contradictory as the fighting was various in result. The Swedes were at first repulsed, and the enemy broke up their first line to pursue. Then Torstenson rallied his men, just as Villars reversed affairs at Hochstedt, 13th August, 1703, drove back the Imperialists in turn, and tumbled them into utter confusion. The first line of the Imperialists took to flight; the second line, ordered to advance to support and retrieve affairs, fell back to a new position, the fifth. Meanwhile, a portion of the Imperial cavalry which outflanked the Swedish line, broke it, partially took it in reverse, and actually got in among the Swedish "*impedimenta*" parked in the woods to the rear of the centre. Then they fell to plundering. This inordinate thirst for pillage was an abiding curse among the Imperialists. It had already lost them several battles, and was yet to lose them many more, even down almost to the present time.

The author of the "Iron Age" and of this war says that this question of abandoning military advantages for "loot" was an absolute rule or custom with the Emperor's troops.[8]

Torstenson's own wife, who accompanied him in all his campaigns, was captured in this attack on the Swedish rear and baggage, and fell into the hands of the Bavarian general, Werth. He, in turn, was surprised by a charge led by Torstenson himself, and the heroic husband had the glorious satisfaction of himself liberating his brave and beautiful spouse. This relief was so sudden that the Bavarian troops got but little return for their breach of discipline, and their disappointment gave rise to another proverb: that "for *glove-money* they were mostly cut to pieces." Werth himself was a prisoner for a short period, but was rescued or escaped.

It was fortunate for the Swedes that their enemy's formation crumbled thus opportunely, since their own cavalry horses were almost exhausted. Not a squadron but had charged six, seven, and even eight times. In the Kurland Regiment not only had many officers been killed, but not a single survivor remained unwounded.

[8] "They, who have made any observations upon the Tragedies of *Germany*, have reported that the greatest losses incurred by the Imperialists, proceeded, either from casting themselves too soon upon pillage, for the advantage of some Battail, or *else from jealousies*."—"*Iron Age*," 224. In our case do we not owe our victories of Shiloh and Cedar Creek, etc., to the temptations to plunder presented to the rebels and afforded by the capture of our camps?

Nevertheless, at this crisis the resolution of Major-General Douglas, and the inextinguishable valor of the Swedish cavalry, decided the fate of the battle. The Imperial horse, which, as often as it had been repulsed and broken, had as often rallied again and reformed on the flanks of the infantry, became disordered by the Scottish general's furious onslaught, and began to give way. Neither the examples nor exhortations of their officers could any longer keep them firm. Their rout once effected, the flanks of the Imperial infantry were left entirely uncovered, upon whom the whole Swedish forces, horse and foot, threw themselves with simultaneous fury. This is the first instance, it is claimed, of a cavalry charge "*en muraille*,"—that is, in line without intervals, as an ocean wave bursts irresistibly upon an insufficient dike, disintegrates it, and tumbles it into chaos.[9]

Hatzfeld justly attributed his defeat in the morning to Goetze, whose conduct was inexcusable, and his disaster in the afternoon to Werth: first, for neglecting, like Goetze, to occupy an advantageous position or commanding height; and, second, for rashness, sacrificing positive advantages to gratify his reckless or impetuous instinct for the aggressive. Parival, as seen, speaks of the fatal "jealousies," which weakened the Imperial military hierarchy. In the very act of consolidating his last line of battle, in fact, at the supreme crisis, Hatzfeld had, while hurrying to and fro, to stop and remove one of his major-generals, Count Don Pompejo, and seek a more willing or capable substitute, Count Bruay.

Thus, with darkness, ended this most stiff and sanguinary battle. The Imperialists lost all their artillery and its trains, seventy-seven cavalry and infantry colors, whatever baggage they brought with them into the field, and four thousand three hundred and nine killed,—among these, Field-Marshals Goetze and Bruay and a vast number of field-officers. A circuit of nine miles was strewn with their dead. Nearly all the Imperial infantry lay upon the field in swathes, like cradled grain in harvest. The Imperial field-marshal, Commander-in-Chief Count von Hatzfeld, and the Bavarian general, Field-Marshal-Lieutenant Mercy, were among the prisoners; likewise three major-generals, seven colonels, nine lieutenant-colonels, "a multitude of

[9] "Although the Austrian infantry undoubtedly fought bravely and obstinately, it was gradually disorganized, driven in, and jammed into one compact mass, without order or susceptibility of restitution to any regular formation by which it could either resist or escape. Shattered by repeated shocks, the orders of the commander-in-chief, who, to the last, displayed the cool courage of a self-collected general and the fiery valor of a soldier, lost all effect. All at once this confused mass dissolved, and at that moment the Swedish cavalry, returning from the pursuit of the Imperial right wing, made a decisive end to the whole affair, falling simultaneously on the front and rear of the infantry, which, completely bewildered and dismayed, left the field to the Swedes, each man seeking to provide for his own safety in indiscriminate flight."

superior (field) and inferior (company) officers," and about four thousand privates.

Lieutenant-Colonel Frittra von Piccolomini, nephew of the brutal but brave prince, Duke of Amalfi, who was the chief factor in bringing about the fall and assassination of his benefactor Wallenstein, died in the hands of his Swedish captors. As an army, that of the Emperor was annihilated; and as an organization, its components were never brought together again under his banner.

The Swedes had about two thousand killed. The fruits of this victory were enormous; it gave up the whole of the Austrian hereditary states north of the Danube, which had hitherto escaped the red-hot iron hand of war, to pillage and military contributions. It carried the torch of war to the very footsteps of the Imperial throne, and if the Austrians had not withdrawn or disabled all the boats on the Danube (as Washington did on the Delaware in 1776 to prevent the passage of that river by the British), and if they had not destroyed all the bridges across the same river for a distance of one hundred miles from Linz to Pressburg, especially the Wolf or Thabor bridge immediately opposite Vienna, the Imperial capital would have been the prize of Torstenson, and the Thirty Years' War would have ended where it began militarily through its occupation by the Bohemians in 1619, although in reality it terminated militarily three years later, in 1648, where it commenced politically in 1618.

In every fact Janikau would have finished the Thirty Years' War if the Transylvanians had not proved recreant to their alliance; and if the plague—which was never absent from the Imperial armies—had not decimated the Swedish veterans before Brunn.

In one respect, says Geijer, Torstenson's campaign had a decisive influence upon the Thirty Years' War. After Janikau, the plenipotentiaries, who finally concluded the peace of Westphalia, advanced from formalities to substance. This victory stretched its rays to the Peace Congress, so that the enemy of Sweden and Protestantism began to be courteous and to speak more humanely. It assuaged the crushing burdens and aggravated misery of domestic suffering; it gave the Swedish people renewed strength to bear their almost unutterable grievances, and Torstenson's cannon at Janikau heralded immediate religious freedom to the Teutonic race and the ultimate triumph of its champion, Prussia, as well as the conferring of the imperial crown of Germany upon its soldier-sovereign in 1871.

J. Watts de Peyster,
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A SUMMER CRUISE WITH FARRAGUT.

About the middle of June, 1867, there rendezvoused at Lisbon, then our headquarters, four United States men-of-war, to one of which the writer was attached.

These vessels had been scattered upon cruises throughout the length and breadth of the Mediterranean, and had now come together to refit rigging, paint ship, and fill the holds and breadlockers from the two store-ships moored in the broad, swift-flowing Tagus.

Upon our arrival the agreeable news met us that we were to go north, in company, to Cherbourg, and there await the arrival of Admiral Farragut, who was coming out from home to take command of the squadron.

It was, moreover, confidently stated that his first visit would be to Russia.

This intelligence was particularly welcome for the reason that we dreaded a return to the Mediterranean summer, with its calms and siroccos, while all were glad to have an opportunity for a peep at the great Exposition at Paris, toward which the whole world seemed at that time to gravitate. These anticipations made the weeks passed in sleepy, hot, stupid Lisbon seem comparatively short.

Those officers who could do so, took refuge at the Hotel Braganza, on shore, thereby escaping the smell of paint, the hammering of caulkers, and the bawlings and objurgations of boatswains and their mates, employed all day long in "setting up" and "rattling down" and tarring rigging to smarten us up for fine company.

Every one pressed the work, anxious to be off, and, on the 1st of July, full of stores and all "a-taunto," we sailed in company for Cherbourg.

Steering north, we traversed one of the most frequented of ocean highways, used by seafaring folk ever since the British dressed in skin garments and bartered Cornish tin with the Phœnicians. The bottom is paved deep with the wrecks of every manner of craft in which man ever ventured to tempt the sea, from the dug-out canoe of the Iberian fisherman to the treasure-laden galleon and the ironclad "Captain." We had lovely weather as we sighted and passed the Berlingas, Vigo-head, and Finisterre, coming then to the Biscayan waters, which are apt

at all seasons to afford rather "sloppy" navigation. Our own previous passages of the great bay had fully borne out the general experience, but on this occasion we had better fortune, and, after a rolling but pleasant passage, with a day or two of detention at the "Chops of the Channel" from very thick weather, we anchored within the great Cherbourg breakwater after just a week's passage.

Cherbourg is a genuine sailor town. It has a large dock-yard and naval establishment, while the good burghers themselves are largely nautical in their pursuits, and, hardened by the rough and fickle weather of the English Channel, are, as seamen, fully the equals of their opposite neighbors of Devon, Dorset, and Hampshire.

Even those of her inhabitants who never go upon the water have a knowledge of foreign languages, of nautical terms, and naval necessities, which makes the old Norman town seem always home-like to visiting mariners.

At the particular period of our visit we were very popular among the townspeople, because we had been there a great deal and always spent plenty of money, and they had a lively sense of similar favors to come when they saw us anchor.

The fight between the "Kearsarge" and the "Alabama" was still a recent event, too, and this action had given their town much notoriety and temporary increase of visitors. It was odd that this naval duel seemed to be considered by the Cherbourgeois as something peculiarly their own, as much so as the dock-yard or the "place," or the high caps and wooden shoes of the market-women who sat there. I have no doubt that some of the good burghers would like to have such a naval tournament provided every year during the "saison des bains," at foreign expense, be it of course understood. Photographs of the victorious ship, her officers, her battery, and the state of her decks after the action were in many shop-windows. We saw no photographs of Semmes or his officers, whose appearance was familiar to many of us. This seemed strange, as Semmes was very fond of having himself photographed wherever he went.

On the occasion of this remarkable pitched battle, and as soon as it was evidently to come off, special trains came down from Paris, Caen, and other cities, bringing crowds of people, who came with their field-glasses to see the duel, and to bet upon it as they would upon a cock-fight.

I believe that most of the Cherbourgeois were glad when the "Alabama," with her English crew, were whipped. At any rate, it was their interest to appear so after the event, which had the effect of making us feel more at home, whether the sympathy was genuine or not.

Many naval men will remember with pleasure M. Édouard Liais, who was at that time our consul, whose father, still living, had also

served many years in the same capacity. These gentlemen, with another of the same name and family, were good specimens of the Norman type, so different from our popular idea of Frenchmen. They were from six feet two to six feet four inches high, spare but muscular, with large bones, light complexion, and keen but kindly gray-blue eyes. Their kindness and hospitality were unfailing, and often, in conversing with them, the thought would arise that the Norman William, before his descent upon the white cliffs across the Channel, grouped about him, from Bayeux and Lisieux, Saint Lo and Port Évecque, just such stalwart forms.

At Cherbourg we had sufficient stir to atone for our sleepy quietude at Lisbon. Some of us, "like good Americans," went at once to Paris, while those who were detained by duty consoled themselves, while waiting their turn, by taking shorter excursions. An examination was made of the great breakwater, much longer and far finer than that at Plymouth, just across the Channel. It has forts and light-houses upon it, and is really one of the great works of the world. Designed by Vauban for "the Sun of France," it was continued under subsequent rulers, being greatly advanced by Napoleon and by Louis Philippe, and finished by Napoleon III. Some of us went to Tourlaville, the ancient and picturesque but gloomy château of the Tocquevilles, whose name is so well known to American readers, while some visited splendid Flamandville. A delightful drive, too, was that to Bricquebec, which a matter-of-fact messmate always insisted upon calling "Brickbats." It is much less frequently visited by tourists than Tourlaville, not being the residence of anybody in particular except a well-known inn-keeper. It possesses an attraction, however, in the ruins of a castle, with its donjon keep, a tower of great height, still in good preservation, with clean-cut meurtrières looking savagely out at one, and dominating, from a little grassy swell, the dull, squalid, stony street of the Norman village. At the time of our visit all the effectives of the little town were out in the fields at work. The very old people, in night-cap and sabots, and the little children in bare feet, with the pigs and fowls and a few stray dogs, kept up a feeble circulation and appearance of life under the eye of a fierce stone general of Napoleon's time, who was mounted on a high pedestal in the middle of the only street.

It seems that the general was born in Bricquebec, apparently for the purpose (after fighting and being killed under the Great Emperor) of being put up in effigy as permanent superintendent of the long-legged, thin-flanked pigs, the ducks and chickens, as well as the "gamins" of his forlorn birthplace. Such is fame! We none of us had ever heard his name before, so that it did not dwell in the memory, but our "cocher," who was also a native, pointed it out with evident pride—and the tip of his whip.

In the ruined court of Bricquebec Castle stands an inn,—partly

modern and partly formed of the walls of the old château. It is called the "Hôtel du Vieux Château," and is celebrated among bon-vivants and holiday-makers in all the country round for the nice dinners served there.

We drove into the court-yard, alighted, and ordered covers for four "du meilleur." While the landlady bustled away to attend to the order, the landlord showed us over the ruin; for, like most continentals in that line of business, he seemed to be intrusted with the ornamental part. Sometimes, however, the landlord is the cook, and in that way works his passage, under the sharp eye of his better half. Among other places he showed us a large upper chamber,—a part of the old castle,—with small windows and immensely thick walls. It was dark, of course, and musty, with a combined odor of onions, dried herbs, and sprouting potatoes pervading it. In the darkest part we saw two of the cupboard-like bed-places—so common in Normandy and Brittany—one above the other, and resembling the berths in a state-room of a passenger steamer, but with much less chance of ventilation. Above these bed-places was fixed on the wall a metal plate, with an inscription setting forth that, on a certain day, "S. M. Victoria, Reine d'Angleterre, etc.," "had visited this château of her ancestors, and slept in this bed." If she did (which may reasonably be doubted), one might venture the assertion that her Majesty never slept in a more stuffy place in all her life. The landlord, as in duty bound, swore it was all true, but we failed to get any particulars, as it "was before his time."

After doing the castle, our friend said that there was still time to visit a Trappist monastery in the neighborhood before dinner was ready, but we declined, as most of us had already seen communities of these very industrious lunatics, the sight of whom is most depressing and not calculated to add to one's enjoyment of dinner. Our dinner, it may be added, was a very good one, fully bearing out the reputation of the cook, beginning with soupe aux écrévisses, and ending with strawberries dipped in Bordeaux, and a charming native cheese.

The afternoon was lovely as we drove back over the hills to Cherbourg. We met the people returning from their work in the fields, who all saluted us gravely, as did the little children coming out of a wayside school under charge of two demure "sisters." They drew up in line, by the road, and bobbed and courtesied in a manner which put the older members of our party in mind of country school manners in former days at home.

About this time Prince Napoleon (Plon-Plon) came into Cherbourg in his yacht, entailing an immense deal of saluting and of ceremonial visiting. Regattas also took place in the harbor, under the auspices of the "Casino," at which the American man-of-war boats carried off a fair share of prizes.

At last, one fine, breezy afternoon in the middle of July, the long-

looked-for "Franklin" hove in sight, with Farragut's flag flying. She was a fine, roomy wooden frigate, of the imposing but obsolete type, which so many naval officers of all nations wish could have remained "the fighting unit."

A very pretty sight she presented as she came in at the western entrance of the great breakwater, under full sail, before a fair, stiff breeze. Her passage from New York had been an unusually short one, and her crew being mostly green, and necessarily undrilled, candor compels the confession that, for all she carried the flag of our admiral, she made rather a shabby "come to" under many critical eyes. Her yards came down all "a-cock-bill," and, when sails were furled, the stowage of the "bunts" of her topsails was not calculated entirely to satisfy the nautical minds of the on-lookers,—and every man, woman, and child in Cherbourg, both afloat and ashore, may be considered a qualified critic in such matters. It is a birthright with them, quite as much as with their opposite littoral neighbors. Then, too, the salutes which ensued were abominably given by our flag-ship. One could fancy the old sea-lion, in his cabin, reminded by the irregular intervals between the guns of a hard-fought battle,—of fire at an object,—rather than the well-timed explosions which constitute so large a part of naval courtesy. The admiral's fire with shotted guns, however, was known of all men to be uncommonly good, and neither he nor his officers could be responsible for the rusty working of an undrilled crew. Matters of course improved rapidly as her men were broken in, and we must remember that it is very seldom that a ship with a newly-enlisted crew at once makes her appearance in a naval harbor like Cherbourg, and encounters the critical eyes of such a fleet as was assembled there at that time.

Soon after the "Franklin," came in the practice squadron, with the midshipmen from Annapolis, just in season to avoid a whole week of raw and very stormy weather (such as the Channel often has, even in July), which for a time prevented communication with the vessels in the roads, in spite of the protection of the great "digue." During this stormy week many of us were in Paris, at the Exposition, the weather being a trifle warm there, but so pleasant that it was hard to believe that gales were blowing, and seas running, so near at hand.

At Cherbourg, on the very day the bad weather broke up, the splendid yacht "Reine Hortense" arrived, with the Empress Eugénie on board.

Such a dressing of ships, and manning of yards, and saluting, and illuminating as ensued upon this august arrival had seldom been seen by the oldest among us. Instead of regular salutes, salvos and broadsides were fired by the French fleet. The Empress always affected the marine, and she was in very gracious mood on this occasion,—volunteered a visit to the "Franklin," climbed up her long ladders, and had her captain to dine on board the "Reine Hortense."

Admiral Farragut was in Paris, at the Exposition, but, being telegraphed to, hastened down to Cherbourg (nearly twelve hours' ride), to do the honors to her Imperial Majesty. As he left the train, on arrival at Cherbourg, he received a telegram from our minister at Paris, informing him that he was invited to dine with the Emperor at the Tuileries, a "command" in diplomatic language. He returned to Paris by the next train, so that he traveled for twenty-four consecutive hours in order to do the proper thing.

The next day the Empress sailed for Havre, amid tremendous testimonials of regard, not only from those who were officially bound to render them, but from boats full of visitors, down for the bathing season, and from yachts of divers rigs and nationalities, being pursued until fairly out of sight by cheers and salutes, so that one would have thought her dynasty established in French hearts forever.

We found France very attractive, but it was evident that if we were to go north we should go at once, availing ourselves of what remained of the fine season.

On the evening of July 30, therefore, the squadron sailed for the Baltic, under the command of the old hero of New Orleans, Vicksburg, and Mobile, his flag at the main of the "Franklin."

We all next day "up channel steered," passing Dungeness, the South Foreland, and the Goodwin, and by the afternoon were well in the North Sea. Here, near the Galloper Shoal, we counted one hundred and thirty sail, all in sight at one time.

The admiral appeared to enjoy being once more at sea, in command of a squadron. He was on the poop a good deal, regulating the movements and positions of the vessels, and using the trumpet himself as they passed within hail. He looked robust and rosy, as active and alert as any of his lieutenants. He had not then passed the ordeal of all the official dinners and junketings, late hours and night traveling, which fell to him in the succeeding year.

In this connection we may mention an incident showing the fortitude and endurance of the man at sixty-seven years of age.

In February, 1868, the admiral, with Mrs. Farragut, and some of his staff, had been traveling in Central Europe, and were to pass through Genoa on their way to rejoin the flag-ship, then at Spezia. The railway between Genoa and Spezia, by the Riviera di Levante, was not yet completed; so the admiral had telegraphed for one of the sloops-of-war, then in the neighborhood, to meet him at Genoa, and take the party to Spezia, only a few hours' run.

When they arrived on board the sloop, Mrs. Farragut told the surgeon that she must positively insist upon his looking at the admiral's back, as he had had what he called a "boil" there for some time; had been dressing it himself as well as he could, and would allow none of them to look at it.

After dinner, at which the admiral played his part like a well man, the medical officer informed him that he had orders from high authority to examine his back. After "pish-ing" and "psha-ing" a little at Mrs. F.'s solicitude, he consented to an examination, which disclosed the existence of a large carbuncle, quite sufficient to have made most men ill and confined them to their bed. Yet with this he had been traveling by rail for a week or ten days.

The weather in the North Sea was good, with the occasional fogs and "thick streaks" inseparable from that sheet of water at all seasons.

As we got farther north, the long days got longer; so that our usually well-behaved live-stock from Lisbon—some of which still remained in the coops—did not seem to know when to go to roost, and the two or three turkeys which were left stalked up and down and gobbled until they were too thin to be worth killing.

The curious weird evening light of these northern climes affected us most unpleasantly. It was like a melancholy, dull, hazy day in a prematurely cool August at home, and the temperature, except for a few hours of midday, was like our late September.

On the third day from Cherbourg we entered the Cattegat (name delightful to schoolboys!) and received a pilot; and on Sunday, August 4, anchored at the entrance of the Great Belt, the pilot requiring daylight to take the "Franklin," with her heavy draught, over the shallow navigation. At daylight we were under way again, the smaller vessels, in single file, following the devious track of the flag-ship over the sandy flats.

During the forenoon we hove to off Nyborg, in Funen,—the scene of the final victory of the Danes over the Swedes,—now an important railway station, and formerly known as the place where very large ships changed their pilots and paid their sound dues. Smaller vessels go, by a much more direct route, through the sound, past Copenhagen.

The flag-ship had lost a marine during the previous night, and the tender "Frolic" ran into Nyborg with the corpse; and a burial party communicated with the proper authorities and buried the poor fellow in this accidental earth. The party received the utmost kindness and attention from the local authorities, and were back again in a couple of hours; while, in any Latin country, the objections and delays and formalities would have been endless.

On the return of the "Frolic," we saluted the Danish flag, which had been hoisted at a battery on shore, and continued our way over the shoal sound until nightfall, when we came to again off Fakkeberg Light, in Kiel Bay, betweon Laaland, the garden of Denmark, but uninviting and low, as its name indicates, and Femern, also low and not near so fertile, its inhabitants being nearly all fishermen. Here the admiral entertained at dinner the officers of the squadron who had

been at Mobile with him,—it being the anniversary of that eventful day.

We were now really at the entrance of the Baltic, and, steaming northeastward, we emerged at last from this wilderness of islands and shoals, discharging our pilots on the 7th off Bornholm, the most unapproachable of the Danish islands, with high, rocky shores, and surrounded by dangerous reefs. Although its people, like their neighbors, take mostly to seafaring, they are also somewhat agricultural; while its quarries afford most of the marble used in the north, and quantities of splendid rock-crystal.

Steaming on past Oland, with the Swedish flag flying on a fort, and past Reval Stone, the outpost and landmark of the very ancient Esthonian town of the same name, we entered the Gulf of Finland; and on the 10th of August, an uncommonly fine and warm day, were up with Högland. Here, at a distance of about one hundred miles west of St. Petersburg, we first saw the St. Andrew's Cross of Russia flying from a tall flag-staff in a battery.

From this point we had the water nearly fresh, and about the color of the Dismal Swamp water, or that of the cedar-ponds in Southern New Jersey.

It was perfectly smooth, and we passed lots of barges and shallops with masts fitted to lower down like those on the Delaware, and loaded deep with pine wood from the creeks and morasses of Esthonia and Livonia and Courland. These were all bound for Cronstadt and St. Petersburg, where they penetrate to all parts of the city by the numerous canals to discharge their lading,—pine wood being the only fuel used in the million stoves of the capital.

The low shores, which we sighted far away, were inexpressibly dismal and depressing in their sameness and solitude, especially as the light of the evening sun seemed to be filtered through some sort of medium which rendered it pale and melancholy.

At half-past seven, the sun still high in heaven, we anchored at Cronstadt, amidst such saluting from all the men-of-war there and the numerous forts and batteries, that the whole roadstead was speedily obscured by smoke as from a prolonged bombardment. It really was not of the nature of an ordinary salute, but a continued salvo. We could see, above the rolling smoke, that the men-of-war had their yards manned, and the men were cheering; but their cheers were inaudible from the roar of the guns.

The admiral, with his rigid naval ideas, did not at first seem to know what to make of it all; but, after a time, he said to the inquiring officers, "Go on! Keep it up! As long as they fire do you fire!" Apparently he applied the same rule to friends as to foes, except that with the latter he shotted his guns.

The air became unbreathable from "villainous saltpetre," and still

the Russians blazed away; and it was a good half-hour before the firing entirely ceased, and quite as long before the smoke-cloud rolled away, for there was no breeze. Then the boats began to arrive alongside, and official visits and personal salutes began, causing another cloud to shut out the novel scene.

Never, in the experience of any of us, had been seen such enthusiasm combined with official politeness. Nor did it appear to be made to order. The rules of naval etiquette and of salutes are closely drawn and alike all the world over, so that one is never forced to do too much. There was a Swedish squadron in Cronstadt at the time, witnesses (and rather prejudiced ones) if any naval solecism was committed by the Russians; but the simple truth was the nature of the reception removed it from the category of ordinary naval courtesies, so that it could only be described by that much-abused word, "ovation."

The next day, which was Sunday, dawned upon us raw and chill, with a steady downpour of rain, which clapped a wet blanket upon the proceedings, and kept even the hardened Russians and Swedes under shelter, and gave us a quiet day below in which to write letters, and prepare generally for a week or two of sight-seeing and festivity.

Fortunately, the storm lasted only one day, and the Monday was fair and unusually clear and bright, so that as many of the officers as duty permitted could start for St. Petersburg at an early hour in a smart, gayly painted, and fast little packet, which left Cronstadt while the gilded spires and domes of the capital were seen at the head of the wide embouchure of the Neva, touched by the still almost horizontal rays of the sun.

A good many Russian officers from the fleet and the garrison were on board the boat, some on the way to visit their families, and some merely going for a "lark" in the city.

As soon as we were fairly off, schnapps and caviare and other curious provocatives to thirst, as well as to appetite for solid aliment, were served in the cabin. Every one seemed expected to partake, and then there was breakfast, at which each paid, as at a hotel, and some of the Russian officers insisted upon opening champagne.

By the time this important business was disposed of we arrived at the quay on the right bank of the Neva, a solid construction of dressed granite, and at once took droskies and crossed the river by the handsome Nicholas bridge, close by. There is a very striking chapel in the centre of the bridge, before which all the passers-by were bowing and crossing. Thence along the English quay until we turned into the great Admiralty Square, where our eyes were immediately attracted by the statue of Peter the Great, on its huge granite boulder, with the great bronze snake writhing under the horse's heels, just like the picture in the *Penny Magazine* of our childhood's days. It was a comfort to find *something* looking exactly as one supposed it did; it is not often the case in one's

experience of travel. What a vast square we are in! and what distances open from it! and what huge buildings appear on every side! And then to think that all this is built upon a morass or quagmire, filled up at the cost of enormous labor and expense, and the driving of forests of piles filled with mountains of rock and earth! Only such an one as Peter could have conceived of such an undertaking, much less carried it out. One easily believes the stories the Russians are so fond of telling, of the thousands of men he had constantly at work; how he made all his nobles build a house, whether they lived in it or not; and how he made every ship entering the port bring thirty pieces of stone, and every country wagon bring ten, as a contribution to the work. They still preserve and show with great pride the little wooden house in which he lived like a Spartan, while his iron will and tenacity of purpose founded a great city in a spot where the bittern and the auk rested in summer, and where the wolf and the bear roved unmolested over the winter ice and snow.

The hotel to which we drove was clean and roomy, built of stone, as most of the buildings in the heart of the town now are. There was a huge porcelain stove, eight feet high, in each room, and not too much other furniture. The table-d'hôte was not remarkable in any way, except for price, while the charges for anything extra, even a bottle of ordinary Bordeaux, were frightful. There might be reason for the latter, on account of high customs duties; but meat, fish, and vegetables are not dear in Russia, and some of the latter, especially cabbage, seem a good deal too cheap for those who don't care for them every day.

In the centre of the wide street, in front of the hotel, was a drosky stand, the frowsy-haired drivers either asleep on their vehicles or beguiling the time, while waiting for a fare, by consuming salted cucumbers and a sort of beer, supplied by itinerant dealers; incarnations of cholera morbus one would think.

There was something about the situation and surroundings of the hotel, with a glimpse of a little park at the end of the street, which put one in mind of the Arlington House at Washington, in the dull season, the drosky-men replacing the tobacco-chewing, cackling negro hack-drivers in the street in front.

The illusion went no farther, however, for the whole atmosphere seemed thoroughly strange, even to those tolerably familiar with foreign parts. Strange costumes, strange lettering on the signs, strange but rather musical language spoken around one, and, still more strange, the day and the short night so curiously blended by the long twilight that one really did not seem to be able to tell when to go to bed or when to get up. There seemed something positively uncanny in seeing people dancing and frolicking at the public resorts at ten P.M., by broad daylight,—a sickly sort of daylight, to be sure, but still daylight.

There are plenty of guide-book descriptions of the "sights" of St.

Petersburg, so I will not attempt them. But I may say that we "did" them all, from the marble tombs of the Romanoffs, on the pavement of the Fortress Church, to the boat built by Peter; from the Winter Palace and the Hermitage to the Isaac and Kazan Churches; and from the Gostinnoi Dwor to the last splendid new Barrack and the great Foundling Hospital. This latter really wonderful establishment supplies many soldiers to the Imperial Army, and owes its great wealth principally to having long held the monopoly of playing-cards, of which the Russians are said to use as many as all the rest of Europe combined.

In the Gostinnoi Dwor, that huge and curious bazaar where one can buy anything, from a needle to an anchor, from a peck of turnips to a pâté-de-fois-gras, the peasants and market-women made quite a little stir over our visit, and held up the children to look at the *officier Amerikanski*, with a broad grin on their good-natured faces. The manner of the lower classes everywhere showed that the cordiality of our welcome was not confined to the officials.

In visiting most foreign cities uniform is a bore; but here we found it pleasant and convenient to wear it at all times; and, although arms were presented with great frequency, and with unusual elaboration of manual, we were repaid fully by finding our buttons a general passport.

The Imperial palaces and many of the public buildings were closed at the time of our visit, for the yearly repairs rendered necessary by the severity of the winter. The Emperor and his immediate family were in the Crimea, but he ordered his brother, the Grand Duke Constantine, General Admiral, to receive Admiral Farragut, which he did in a style becoming a Russian Grand Duke and a brother sailor. The same telegram ordered that the officers of the American squadron should have access to any of the galleries, or museums, or other public buildings, whether closed to the general public or not, on simply presenting themselves in uniform. In St. Petersburg the man in uniform has the advantage of the man in plain clothes in most ways, I fancy.

Of course it was unfortunate that Admiral Farragut had to come there in August. It was precisely as if some very distinguished person should come to Washington in that month, and the officials whose duty it was to meet and entertain him were obliged to hurry in from their cool and comfortable summer retreats to tender perfunctory civilities. Our Russian friends had to do this, but they did it very cordially and very well.

After seeing a little of the capital, the admiral and a large party were sent to Moscow by express train, while those who disliked the long and fatiguing ride, or were detained by duty, recompensed themselves by using their "open sesame," and examining again the Hermitage, with its profusion of art treasures; in once more walking through the splendid halls and staircases of the Winter Palace, or inspecting

the "Orloff" and other crown diamonds, contained in rooms guarded by veterans who were models of military bearing, apparently selected for size, and with their breasts covered with medals.

The guards and attendants were everywhere most civil, and we were repeatedly told, "Anything you like to see, gentlemen, we have orders to show you."

As the Imperial family was absent, we had the opportunity of seeing the private apartments in the Winter Palace. The boudoir of the Empress is at the northeast angle of the palace, with a cheerful outlook upon the lively traffic of the quay and square. In one corner was raised a dais, which was the size of an ordinary bedroom, and surrounded by a low railing such as we see in offices. Here, we were told, the Empress usually sat, speaking to those who came on business as they stood outside the railing. Comfortable low sewing-chairs and other evidences of habitual occupation were seen within the rail, while over it trailed quite a thriving parlor ivy, which the attendants drew attention to, and evidently considered a triumph of horticulture.

From this apartment a door opened upon a narrow, winding stairway, which led to a bath-room in the entresol. The bath was a large marble one, the top flush with the floor, and two or three steps led down to it. On the door was the life-size painting of a gigantic grenadier on guard, in the uniform of the time of the first Alexander. Though only an effigy, it seemed a strange thing to find in a lady's bower.

The surroundings, as well as the persons of the distinguished of our own time will always excite the most lively interest, and so we were particularly anxious to see the private rooms of the late Emperor Nicholas. There was more delay and ceremony about entering these than the diamond room, or the most gorgeous hall in the palace. They could not be more unpretending: three modern-sized rooms, en suite, with low, arched ceilings, at the northern end of the palace, in the entresol, and nearly under the present Empress's apartments. In these contracted quarters the eminently handsome, stern, proud, but narrow-minded man lived his laborious and gloomy life, "consuming his heart," as the Easterns say, working harder than any employee in his huge empire, although, as he well knew, much of his labor was that of Sisyphus.

The grenadier of the guard who accompanied us showed us the small iron camp-bed on which the ruler of so many millions always slept, and on which he died. The handkerchief which had wiped the death damp from his forehead was stuffed under the pillow. In a corner was the plain washstand, with well-used brushes, soap, and other articles, just as he left them. In another corner was a rack, with a regulation musket and fixed bayonet (they say no man in all his army knew the bayonet exercise better), and his uniform helmet hung over it.

His well-worn gray military cloak, well brushed and carefully folded, lay on a chair beside the rack, and on it another handkerchief. Of these latter articles we observed several more in different parts of the rooms, as if he wished to be able to lay his hand upon one, at any time, without moving. A plain wooden table held his writing materials, which were of a very ordinary description,—no crystal and ormolu ink-stands or gold-bound blotters here. The pens and pencils showed that they had been well bitten, even gnawed, and the table was covered with blots and splashes of ink. One sees, from this description, that the rooms are scrupulously kept in the exact condition in which they were when Nicholas died. When they are cleaned or dusted, jealous eyes see that every article is restored to exactly the same place where it had previously been.

Indeed, the apartments looked as if the Imperial occupant had just gone out to a review or inspection, and might be back at any moment, and the awed, reverent manner of the custodians helped the illusion.

The history of the Winter Palace has much to interest one. The Empress Elizabeth, for whom it was built, died the same year in which it was completed; the huge building, five hundred feet long and four hundred deep, having been eight years in process of construction. In spite of its size and the great number of its apartments, a great deal of it gradually became disused, owing to a custom which prevailed, upon the death of any important member of the Imperial family, of permanently closing the private rooms which they had occupied.

Thus the palace would, in time, have had nothing left for use but the public rooms, and it was not, therefore, an unmixed evil when, on a bitter winter night in 1837, the palace took fire, and in a very short time was totally destroyed. The Emperor and his family were at the theatre at the time, and Nicholas galloped at once to the spot, penetrated the burning building and, it is said, himself relieved two sentries who had been forgotten, and who were standing at their posts, with shouldered arms, awaiting death. Driving out these men before him, he dashed the hilt of his sword through an enormous mirror which some zealous palace servitors were loth to abandon, and had scarcely hurried the last of them out of the building when the roof and floors fell in. Satisfied that no more lives were in danger he retired to another palace, where he had sent the Empress, and where, through the devotion of her immediate attendants, she found all her toilet articles, the clocks, vases, and ornaments of her private rooms, ready arranged for her use, just as at home, they being almost the only things which were saved uninjured.

Next day Nicholas went to the ruins of the palace, where the fire was still burning within the walls. Efforts to save it had early been abandoned, and all energy expended (successfully) upon saving the Hermitage adjoining.

After musing for some time, the Emperor suddenly said, "This day year I will sleep in my room in the Winter Palace. Who undertakes the building?" The thing seemed impossible; but at last one of the group, General Kleinmichael, stepped forward, and said that he would. The palace was destroyed in December, 1837. In December, 1838, it was rebuilt, and in March, 1839, fully occupied. The result was achieved at a tremendous cost, both of money and of life. It went on day and night, the workmen relieving each other, without any pause. The building was kept, during the autumn and winter, at an excessive temperature, in order to dry it, and many of the workmen and decorators were carried out of it ill, never to recover.

Perhaps Nicholas knew nothing of this, or did not care to inquire by what means the work was pushed; but, at all events, on the anniversary of the fire he, with the Empress, their family, and suite, walked through the palace, reconstructed much upon the original plan. Pausing in the splendid St. George's Hall to inspect the decorations and the huge chandeliers, the Empress complained of fatigue, and would have sat down, but there being no seats as yet in the hall, she walked into the next apartment, followed by all the others. The last of them had scarcely passed the doorway when a thundering crash shook the whole building, and the air was obscured by clouds of dust. The timbers and ceiling of the vast hall had given way under the weight of the chandeliers, and had fallen with crushing force.

The Russians say, in relating the story, that the patron saint of the Empire watched over and preserved the Imperial family.

Of course, during these days of sight-seeing in a city of magnificent distances, we did much drosky driving, and thus became quite familiar with those light-hearted vagabonds, the drivers. They seemed never to undress or to go to bed, and for reckless driving, bonhommie, and impudence, combined with good temper and desire for extra copecks, they will ever hold a place in our memory with the "kyar" drivers of Dublin.

In front of the opera-house, and in other public places in St. Petersburg, we saw long rows of iron crates, which the drosky-men were using as mangers, and from which their horses ate their coarse hay. On remarking to a resident the strange position and apparently unnecessary solidity of these mangers, he laughed at our greenness, and informed us that the arrangement was for the purpose of being filled with burning fagots during the long winter nights, to keep the coachmen and their horses from freezing. It is a necessary precaution when we remember that it is often necessary to relieve sentries, however warmly clad, every half-hour to prevent them from freezing to death.

Recalled to the squadron at Cronstadt for the purpose of receiving the Grand Duke Constantine, we had two or three days of most raw and

disagreeable weather, the banks of vapor sweeping about us as if we were living in the clouds. In spite of the weather the Grand Duke made his official visit and inspection, being received by Admiral Farragut and all under his command in full uniform. The official number of guns was also fired and the official luncheon was eaten. We had again a great cloud of powder-smoke (the incense of naval heroes) hanging over the water and the forts and the ships, so that the lines of men on the manned yards could rarely be seen, their position being recognized chiefly by their cheering. The Grand Duke resembled much more an English Guardsman than a naval officer, with his long, light Dundreary whiskers and "pince-nez" glasses.

After this came some fine days, with that same weird northern light which all fine days have here. A large party of officers went to Peterhof, one of the best known of the Imperial palaces, charmingly situated upon the Neva, and commanding a fine view of St. Petersburg as well as of Cronstadt. At Peterhof there is a wealth of fine trees and flowers in quaint garden-plats,—rather unusual in this Boreal region,—while the "Golden Staircase" and other noble fountains almost rival the "Grandes Eaux" of Versailles, while they have the superior merit of running all the time, and not to order.

It was Sunday, and the palace and its grounds, as well as the roads leading from them, were thronged with holiday-makers, among whom we wandered about and enjoyed all the sights, and in return excited the curious but kindly stares of the people. In the evening we received from some villa residents in the neighborhood a great deal more hospitality than we had any right to expect from strangers; so that we did not get back to the squadron until very late—or, rather, very early on the Monday morning. But then late seemed early and early late under those skies.

It was fortunate that we got this peep at Peterhof, for our time was growing short, and we had hardly returned before a southwest wind set in, which seemed an unpropitious summer wind here, and we had more days of drizzle and dismal rawness,—like our November. During this time, however, we managed to explore pretty thoroughly Cronstadt town, the forts, and the fine arsenal and docks, receiving everywhere the utmost civility.

The batteries which rendered St. Petersburg impregnable during the Crimean war were shown by fine old non-commissioned officers of both army and navy. They were, apparently, picked veterans,—fine specimens of manhood,—approaching the reigning family in size and military bearing.

The houses of the merchants and bourgeoisie generally are most solidly constructed, often of only one story, and generally with rooms en suite. They are very comfortable, no doubt, and easy to warm in winter, and they have few staircases to mount; but, with their

double windows, only a few panes of which open, they are rather close and stuffy in summer. But then the summers are so short, and during the season these people appear to live as much out-of-doors as possible.

Toward the end of August we had an invitation to some very grand church ceremonies, the 27th being the anniversary of the patron saint of the town of Cronstadt. It is the etiquette to attend these great ceremonies of the Greek Church in full uniform, and to kiss, in a fervent manner, any relic which may be presented. But on this occasion the long-haired and bearded priests only presented the relics, whatever they were, to the Russian officers, who kissed them; but we thought, from some observations from the corner of the eye, that a great many of them did not like it. There were also many Swedish officers present on this occasion, and the scene in the church was a striking one, the chanting voices very fine, and the swinging censers perfumed the air with the particularly pleasant Russian incense,—so much better, we thought, than that used in Latin churches.

After the religious ceremony came an early dinner, given to us by the municipal authorities, at which there was plenty to eat, and a tremendous amount of drinking and speech-making. The latter was of course complimentary, but unintelligible, to us, while our responses in English were not understood by our hosts; but, on the neutral ground of shaking hands, clinking glasses, and "no heel-taps," we got on charmingly. As this was a rather democratic banquet, the mirth grew fast and furious some time before we withdrew, which we did, I am happy to say, in good order and in spite of the hospitable remonstrances of the citizens.

In the evening there was a grand ball given to the admiral by Admiral Lissoffsky, the Governor of Cronstadt,—the same officer who came over to America during our war, with quite a large squadron, to render us at least moral support in our struggle. He was a rather small and active man, with a vivacious manner, and gave one more the idea of a Frenchman than a Russian. The ball, given at his fine official residence, was a most refined and elegant affair. The entrance-hall and staircase were lined with soldiers and sailors, and a great presenting of arms went on, for nearly every male guest was in uniform. Among the ladies present there were some who were remarkably handsome, and all danced exceedingly well.

Admiral Lissoffsky had fine weather for his entertainment; but when Admiral Farragut, a day or two after, gave his *matinée dansante* in return on board the "Franklin," the weather was again raw, rough, and unpleasant, and the spray flew from the bows of the steam launches and cutters which brought our guests alongside, in a way to make one tremble for full-dress finery, whether male or female. But the band struck up, dancing began, the buffet was opened, and champagne corks

popped, and very soon the guests had forgotten whether the weather was propitious or not. Naval balls are generally successful, and I think I may venture to assert that this one was no exception to the rule. It was intended to be the finale to our jollifications here, as it was necessary to hasten our movements and to be out of the Baltic, if possible, before the autumnal gales set in.

Admiral Farragut had been invited to make a grand review of the Russian Baltic Fleet at the termination of their summer drill and manœuvres, and this was a professional compliment which he was not at liberty to refuse; so, early in the morning of the 30th of August, we all sailed from Cronstadt and stood north, along deep channels, escorted by several Russian frigates and corvettes, and passing by no less than ten monitors stationed at intervals along our route, each of which in turn saluted us with the "boom," "boom!" of her two heavy guns, and then fell into line astern. Our way led between a long chain of islands and the mainland. The shores were very solitary, there being no evidence of life, and the pine forest clothed them to the very water's edge. The monotony of the scenery was very depressing, the atmosphere was murky, the day overcast, and the water leaden in color and dead smooth.

In the afternoon we anchored at Transund, near Viborg, the capital of Finland, where we found the Russian ironclad fleet moored in a noble roadstead.

As we steamed in with our escort we were welcomed with salutes, manning of yards, and cheering,—much more in accordance with naval etiquette than our uproarious reception at Cronstadt had been.

We were now north of the latitude of the Shetlands, and where the limits of fair and foul weather are not very strictly defined; but the day following our arrival being tolerably pleasant, we had plenty of visitors from the town as well as from the fleet, and refreshments were the order of the day until we were tired of the sight of the table.

In the evening the Russian admiral entertained Admiral Farragut at dinner on board the flag-ship, and the latter had hardly returned to the "Franklin" when he was made the recipient of a most striking and novel kind of serenade.

The night was very dark, even gloomy, and nothing was to be seen but the twinkling harbor lights of the numerous men-of-war at anchor in the broad sound.

Suddenly the water in the vicinity of the American squadron reflected the brilliant light of hundreds of fat-pine torches held by sailors of the Russian fleet, who stood in long lines of launches towed slowly by steam-tugs. They circled round our flag-ship at about a cable's length distance, while the men sang the Russian hymn in full chorus. The effect was grand. The Russians, as a rule, sing very well, and their regiments chant the same noble hymn when going into battle.

The smooth water and the lofty sides of the vessels re-echoed the voices finely, and, when the strain ceased, the torches were simultaneously thrown into the water, and utter darkness reigned at once. This unexpected and beautiful compliment gratified the admiral and all of us exceedingly.

September came in upon us squally and blustering, as if to remind us that we were lingering too long in the parallel of Hudson's Strait and Alaska; but Admiral Farragut, with a large staff drawn from all the vessels of his squadron, made a thorough tour of inspection of the Russian ironclads, during which everything was conducted as if he was one of their own general officers on an official visit.

During this day the friendly visits to all our ships continued, and we received the most cordial invitations from inhabitants of Viborg and from Finnish gentlemen who were proprietors of estates in the neighborhood; but, as time pressed and our hour for sailing was appointed, we were obliged to excuse ourselves, and at three o'clock on September 1, the weather clearing a little, the squadron got under way for Stockholm.

A Russian navigating officer was placed on board each of our ships to pilot us clear of Russian waters. "Welcome the coming, speed the parting, guest!" Their hospitality was true to the last.

That same evening nasty, raw, thick weather set in again, with a chopping sea like that of our lakes. Men were made sea-sick who had never experienced the sensation before. The sea and the atmosphere had a peculiar dun color, and we passed Helsingfors and Sveaborg without being able to make out any lights or beacons, grubbing our way industriously by the lead. When we assembled for breakfast next day, we unanimously voted the Gulf of Finland a bore, the Russian officer laughingly and cordially assenting.

But we had "worse and more of it," as Jack says, when we emerged past Hango Head, and came to cross between the Gulf of Bothnia and the Baltic, south of the Aland Islands. Persons who have crossed the English Channel in bad weather think they know what a cross sea is, but they may rest assured that it is nothing to what the Bothnian Gulf can do.

At last we ran in among the "Thousand Islands" which veil the approach to Stockholm, and the change from the trying motion outside to the perfectly smooth water in the deep, narrow channels was delightful. The weather cleared, too, with that pale approach to sunlight which ripens rye late in August, and which passes among untraveled Scandinavians for the genuine thing. The passage up through the islands was most interesting. Most of them were mere masses of rock, clothed with pine, rising abruptly from the water, with deep channels between them. They varied in size from one acre to one hundred, and on the larger ones we occasionally saw a clearing in

which stood a snug log cabin, the blue smoke curling from the chimney, and nets drying on the mossy rocks near a landing. The men seemed to be away at their work, but the women were sitting at the doors sewing or spinning, with their children playing about them, and upon seeing us would run down to the edge of the rocks to wave their hands to the strange ships so silently and deliberately threading their way through this labyrinth. The whole scene was most peaceful and Arcadian.

As we wound through the channels in single file, the leading ship would often disappear altogether, shut in by a sudden turn, and we often seemed to be running into a rocky "impasse," to shiver our headbooms against the steep shores, when the way suddenly opened again, and we went steadily on. There seemed to be always plenty of water, and the pilots knew the intricate path perfectly.

During the afternoon we anchored at Waxöe, or Waxholm, twelve or fifteen miles below Stockholm, as we could go no farther on account of there not being sufficient water for the "Franklin."

Waxholm, with its heavy forts and batteries, is the great barrier of the water-approach to Stockholm, and here was done all the saluting and official visiting consequent upon our arrival.

A Swedish naval officer in a nice little steamer was sent down from the capital to be at the disposition of our admiral during his stay, and many of us availed ourselves of her return to go up to the city.

After passing above the forts, we saw along the water some pretty marine villas of rather a modest sort, in front of which often stood groups of young people waving handkerchiefs to us, the young ladies looking fresh and pretty in light muslins, as if they thought it was really summer. Indeed, the weather was very fine and settled during our stay here,—a little chilly in the morning and evening, but the midday perfect.

Most of us went to the Hôtel Rydberg, one of the best in the city; and during these days we had the curious and unusual sensation of having at last fallen upon a cheap place, one where we were not looked upon as fair game by hotel- and shop-keepers. In fact, during our whole stay we were in a chronic state of surprise at not being victimized, as in the other capitals.

In traversing the city and its environs use is made of the pretty steam-launches, which have so entirely usurped the place of the boats pulled by women, formerly a prominent feature on the blue, rushing streams which run through Stockholm from Lake Malar. After a day spent in pleasant excursions, or shopping, or sight-seeing, we several times wound up the day at the Djürgarden,—a beautiful park, with fine trees and gardens, where the people go to wander about, eat, drink, and be merry, and so enjoy the short summer. At the restaurants in the park,

with their out-door seats and tables, when our uniform was seen, the bands ceased the airs they were playing and struck up Hail Columbia or Yankee Doodle, and more than once we were asked to join family groups and have refreshments.

On one occasion, when some of us had politely declined this spontaneous hospitality and thought that we had established ourselves independently, we were told, upon asking for our "Rechnüng," that a gentleman, who was gone, had settled our bill.

In this weary world it is well to have found at least one place where the name of one's country (apart from one's private virtues) afford, as on this occasion, meat and drink without money and without price, for the waiter said he dare not take anything from us.

The admiral and many of the officers were entertained at breakfast by the King, in the handsome and imposing palace which towers over the city from the Gustavsholm. The palace contains, beside the official and private apartments of the royal family, a fine library, an excellent gallery of paintings, and a valuable and curious collection of coins and northern antiquities.

Before we sailed the admiral gave a dance on board the flag-ship. Many of the guests came down in the government steamer, but others came winding through the intricate passages in the pretty and swift steam-launches, of which they have so many. We had a most delightful hop, and it was very late before the last of the steam-launches, with its laughing party of ladies, blew its shrill whistle and turned its sharp prow to the swift, blue stream.

Indeed, we found Stockholm and her people very charming. There was cordiality such as is rare to find anywhere, and something new in climate, scenery, and manners. There are many traces, among all ranks, of the infusion of French blood, mostly due to the Bernadotte dynasty and its followers. The King himself was dark, but most of the officials we saw were pure Norse in feature, hair, complexion, and build. Most of the pretty girls were fair, but one often saw one whose brunette complexion and dark hair, *soupçon* of coquetry, and charming airs and graces we attributed (whether correctly or not we did not know) to Gallic intermarriage.

The swift northern autumn kept driving us southward, and, much to our regret, we sailed from Stockholm on the 9th of September, and once more threaded those beautiful, silent, mysterious-looking passages, getting out to sea in the evening.

The weather had become decidedly cool, especially to those who had been long in the Mediterranean, but the next day was pleasant enough, with a smooth sea and overcast sky. We took advantage of it to have the quarterly target practice, and the squadron, for some hours, circled about the floating target, keeping up a sharp fire. No doubt the honest people of Gottland and Oland wondered much at the

heavy and prolonged artillery fire. The delay was necessary, according to "Regulations"; but we had scarcely borne up again when we met a fresh southwester, never a nice wind in these parts, and dead ahead. So we lost a great many miles by our target practice, and did not come up with Dars Point until the 11th, or enter the Great Belt until the 12th.

Here about midday, as we were steaming quietly along in charge of pilots, the "Franklin" suddenly ran upon a sand-bank just off Nyborg. The other vessels stopped in time, and two of them hauled away at the big ship with hawsers until late in the evening, when she came off safe and sound. The incompetent pilot was discharged then and there, "with a flea in his ear"; and, after anchoring during the night, we all sailed at early daylight, prepared to be our own pilots to Elsinore. When day broke it was dirty weather, of course, two fine days seldom coming together now; but we set off from our rather shoal anchorage and stood through the Belt.

The navigation was intricate, especially for strangers, for there were Rennen, and the Hasteens-ground, and Hasselöe, and the Lysse-ground, and divers other reefs and shoals,—man-traps for careless mariners; but avoiding them all, and leaving Anholt light astern, we at last ran south into "the sound."

As we passed Elsinore late in the evening, it was too dark to see whether Horatio or the Ghost were upon the platform, and the navigation was becoming very ticklish again, for there were lots of vessels, of all rigs and nationalities, concentrated here, either wind-bound and at anchor or passing.

This is one of the great marine thoroughfares, not perhaps so frequented as the English Channel or the Straits of Gibraltar, but with traffic sufficient to fully account for the large sum paid Denmark in lieu of the sound dues.

As compared with other European ports we hear little, in our country, of the important Baltic cities, such as Reval, Riga, Memel, Dantzig, Stettin, Stralsund, Rostock, and Lubeck; yet an immense amount of tonnage is owned there by enterprising merchants, and all use the sound. As the night became pitch-dark, with a pouring cold rain, we were at length compelled to anchor to avoid collision.

Next day we anchored off Copenhagen,—a long way off, too, as we were about in the position occupied by Sir Hyde Parker when Nelson went into battle here, at "ten of April morn by the chime," in the first year of this century. Here it was that, finding the Danish batteries hard nuts to crack, Sir Hyde made the signal to withdraw from action, which Nelson looked at with his blind eye and swore he did not see. Nothing succeeds like success, and so there was no court for as gross a disobedience of orders as ever an officer committed.

A dreadful day was that for the Danes, although

"To battle fierce came forth
All the might of Denmark's crown.
* * * * * * *
And the prince of all the land
Led them on."

It is hard to tell whether the Danes deserved more sympathy on that occasion or six years later, when England, under the aggravation of having the Baltic closed to her, and suffering from the nightmare of invasion by the collected continental fleets, sent Lord Cathcart to batter the quaint gables of the low-lying town about the burghers' ears, while Admiral Gambier lugged off their whole fleet at one swoop. "The benefit to England was not what she had acquired, but what Denmark had lost"; and the very ancient kingdom never recovered her lost prestige, any more than her lost line-of-battle ships.

Large vessels can go into the arsenal at Copenhagen, but the approaches for them are very intricate; so the disagreeable but necessary process of "coaling ship" had to take place in the roads, and, of course, all who could get leave passed that period on shore, where there was plenty of occupation in visiting the many interesting edifices and places connected with the history of Denmark, and especially in inspecting the unique and wonderfully complete museum of northern antiquities.

King George, of Greece, but recently endued with the purple, was just then revisiting his old home, and his papa and mamma: appearing to enjoy his holiday with all the zest of a boarding-school boy. As he was still very young, I have no doubt that the Greek orderly officers who accompanied him everywhere must have proved bores.

He was a clean-skinned, fresh-colored youth, with a manly, frank expression, clear eyes, and straight legs, looking as if he would make a good cricketer. King George had been brought up in the Danish navy, and is said "to have had the making of a good officer," to use a nautical expression.

During our stay at Copenhagen some of our officers were one morning paying a visit to Admiral and Mrs. Farragut at their hotel, when some cards were brought in by a servant. The admiral glanced at them and appeared interested, ordering the ladies to be shown up at once, and going out into the corridor to receive them with many cordial shakes of the hand. He returned in a moment, ushering in two ladies quite advanced in life, with peculiar dress and silk reticules upon their arms,—altogether very prim and old-fashioned. They were evidently highly gratified with their cordial reception, and the admiral, in introducing them, explained that they were the daughters of a very old and kind friend, formerly Danish consul at Tunis, in whose family he (the admiral) had received much kindness during illness while he was a midshipman in the Mediterranean and the century was yet in its "teens." These elderly ladies were then little girls. One of them produced from

her reticule a letter which had been written at that time by Farragut. It was yellow and the ink faded, of course, and announced his arrival at Leghorn, improvement in health, and the intention to join his ship. The old gentleman was exceedingly touched by the kindly treasuring of his memory for so many years, and said (very truly) that he could not write a better letter now. After a long and cordial talk the ladies took leave, escorted to the entrance of the hotel by the admiral. Several persons spoke to us of their surprise that "the old Miss ——s" should have known anything of the lion of the day, and no doubt the ladies were in great request at tea-parties in consequence.

In spite of much attention and hospitality from all sorts and conditions of men, it became necessary for us to push on, and on September 20, at about midday, we sailed from Copenhagen, passing Elsinore before sunset, so that we had a fine view of the castle. This is called the Kronberg, a large and striking mass of masonry, the style a mixture of Gothic and Byzantine architecture, reminding one somewhat of Venice or Taranto. A tall and graceful tower, for a light, rises from it with very pleasing effect.

On the day after we were off "the Skaw," with a strong westerly wind, which piped up in the afternoon when we got into the Skagerrack, raising a tremendous, hammering head sea. A very low barometer gave presage of more to come, and in the evening the real gale, for some time brewing, burst upon us from the westward. Just to leeward of our position are treacherous, far-reaching sands, upon which many vessels are cast away every year, and on which both English and Russian first-rates have been lost with every soul of the hundreds on board of them. We struggled along on the starboard tack, half under water from the seas which boarded us, and with devout wishes that we were a few miles farther to windward.

The bad weather lasted three days, and once during a partial break we caught a glimpse of the "Franklin," far to leeward of us, under close reefed maintopsail and foresail, and we took comfort accordingly, as it showed us we were a long way off the lee shore yet.

This gale dispersed the squadron, every ship taking care of herself; but such a contingency had been foreseen, of course, and proper orders issued beforehand. The writer's ship went into the Helder when the weather permitted, and glad enough we were to exchange the still turbulent North Sea for the peaceful Dutch anchorage of Nieuwe Diep.

E. S.

UNITED STATES TRAINING-SHIPS.

Ici on parle Anglais.—This notice, so frequently seen in the shop-windows of Paris, was not very long ago placarded in the starboard gangway of one of the ships of our Mediterranean squadron: "English spoken here!" The few American sailors who belonged to that ship had good reason to give such a notice a conspicuous place, for in walking along her decks one might hear French, German, Spanish, Italian, the mongrel Mahonese, the native Irish, and occasionally Chinese, all spoken with equal fluency by some one or more of the ship's company.

The jest had at least the merit of a good point, and that point was a severe commentary on the character of the crews we have been for years employing to maintain the honor and integrity of the American flag on the ocean. A careful count of all the sailors of the Mediterranean squadron, made about the time of the above notice, showed that thirty-five countries were represented by them, and that considerably *less than one-half* were American born.

These facts being pressed upon the attention of the United States government, steps were taken to enlist boys with a view to training them up for the navy, so that we might have our petty officers and leading seamen, at least, native-born. There were other considerations which doubtless had their full weight in inducing the government to adopt this measure.

The many and altogether novel devices of modern naval warfare require for their manipulation a higher order of seamen than in former times. To load and fire the old 18-pounder, or at most a 24-pounder, mounted on a four-truck wooden carriage, was the highest achievement as a gunner that the sailor of 1812 was required to reach. He was not so foolish as to depend on a lock-string merely; he had besides a trustworthy match, which he used according to the following formula: "Handle your match and lock-string! Cock your lock! Blow your match! Watch the weather-roll! Stand by—fire!" And if he hit anywhere about the broadside of a lofty frigate, or cut away any of her spars or rigging, he was lucky indeed! He was withal a good topman; for, did his own masts or rigging suffer, he left his gun for the nonce, repaired damages, and resumed his fighting with increased ardor.

Of the modern man-of-war's-man a far more extensive range of duties is required. Machinery now forms such an important element in nearly all implements of naval warfare, that the sailor of to-day must be something of a mechanic. The revolving turret of the monitor; the method of working the 15-inch gun; the heavy breech-loading rifle-guns; the Gatling boat-guns and magazine-guns, all require carefully-trained men for their proper handling. With these and similar "arms of precision," it is expected that the vulnerable parts of an enemy's ship will be speedily reached and the battle proportionately shortened.

Modern man-of-war's-men, moreover, are expected to be tolerably fair infantry-men. Armed with breech-loading rifles, they should be able to land, form under cover of their ship, and march to meet an enemy according to the rules laid down in infantry tactics. To pass through the "School of the Soldier," thence, through the company drill, to the "School of the Battalion," requires much patient drilling and frequent opportunities for landing; for, after a certain familiarity with the simpler movements has been attained, such drilling cannot be continued on the deck of a ship.

Nor is this all. The torpedo has become a recognized weapon of warfare, and as our officers are carefully instructed in the use of that terrible agent, it is manifest that the sailors, or at least a certain proportion of them, should also be instructed in their handling; for the officers will often require the aid of intelligent labor in the operations of torpedo warfare. For this reason, and for the reasons that the bottoms of our ships require to be occasionally examined, the propeller cleared of ropes or other obstructions, etc., it becomes necessary that all our large ships, or at least every flag-ship of a squadron, should have one or more expert divers. Hence a corps of divers for the navy has become a necessity of the times, and these divers, besides being trained as seamen, should be trained also for submarine warfare.

Congress had already passed a law, that "boys between the ages of sixteen and eighteen years might be enlisted to serve in the navy until twenty-one years of age," etc.[1] So that, under sanction of law, the Navy Department issued a circular (April 8, 1875) stating that a limited number of boys would be enlisted with a view to training them for the naval service. Eighteen—the higher legal limit of age—was thought to be too old, save in exceptional cases where the applicant had already been to sea or exhibited a special aptitude for the service; hence the limits of age fixed upon by the Department are *sixteen* and *seventeen* years. To secure admission each boy is required, by the cir-

[1] Since the above was written, Congress passed an act authorizing the enlistment of 750 boys over and above the complement of the navy, making a total of 8250, and limiting the age of admission to fifteen years.

S. B. L.

cular, to be able to read and write. He must also be of robust frame, intelligent, of perfectly sound and healthy constitution, free from any physical defects or malformation, and not subject to fits. The applicant for admission must be developed in proportion to his age; that is to say, a boy of sixteen should stand five feet and one inch in his bare feet, and measure thirty inches around his chest. The regulations are quite stringent in regard to boys having the consent of their parents or guardians, the latter being obliged to sign a paper, under oath, that they are the parents or legally appointed guardians, and that they give their consent to the enlistment of their son or ward to serve during minority. Boys enlisted under the provisions of this circular are entered as "second-class boys,"[1] and paid at the rate of ten dollars and a half per month, and one ration,—a ration being the daily allowance of food. They are furnished with an outfit of clothing, the cost of which is charged to their accounts. The academic part of their instruction is confined to the elements of an English education, but great stress is laid upon all the technical branches, such as seamanship, gunnery, etc. Object-teaching is included in the methods of instruction, and physical training occupies a more prominent place than in any other system of education, probably, in the country. The brain culture furnished by the Naval Academy is here supplemented by trained muscle. Under a wise system the two schools should together form the most thorough *personnel* in the maritime world.

The circular once issued, the Department lost no time in inaugurating a training system on board one of our largest and finest frigates, and such regulations were framed as would best carry out the objects of the system.

The department of seamanship embraces practical seamanship, such as knotting and splicing, reefing, loosing, furling, making, shortening, bending and unbending sails; steering; heaving the lead, etc.; sail-making, signaling by the army code, as well as the naval and international codes; the handling of boats, swimming, the use of the diving apparatus, etc.

The gunnery department embraces the theory and practice of gunnery, exercise of the howitzer ashore and afloat, the Gatling gun, infantry drill, pistol, broadsword exercise, boxing, etc., and eventually the practical use of torpedoes.

The department of studies includes reading, writing, spelling, arithmetic (through decimal fractions), grammar, geography, naval history and the history of the United States, moral and religious instruction, and singing.

In the department of machinery, which embraces instruction in the coaling and working of fires, the construction and operation of boilers,

[1] It is contemplated under the new order to enlist minors hereafter as "third-class boys," at nine dollars and fifty cents per month.

steam and water-gauges, etc., a special class is formed of boys having aptitude for that calling. In a complement of three hundred and fifty this class has been limited to eighteen. A certain amount of instruction in other departments is also afforded them.

A volunteer class in practical navigation has been formed on board one of the ships designated for training purposes, with the view of teaching the elements of that science to the future boatswains and gunners of our service, who may, in some possible contingency, be detailed as officers to carry prizes to an American or neutral port. When it was found that out of a crew of three hundred only ten boys availed themselves of this privilege, those who hold conservative views on this system will no longer fear that the majority of the apprentices are being educated above their sphere.

Called at early daylight,—at 5.30 during winter and 4.30 during summer,—the boys are required to turn out promptly, lash up their hammocks neatly, carry them on deck, and stow them in the hammock-nettings. Twelve minutes is the time generally allowed for this. Staying the stomach with a ship's biscuit and a pot of coffee, they are then required to scrub the decks or their spare hammock or clothing, as the ship's routine of work may call for, and put the decks to rights. At seven bells,—half-past seven,—having previously washed their faces, hands, and feet, they are drawn up in line and carefully inspected by a petty officer, known as the master-at-arms, assisted by one or more ship's corporals. The hair of the boys is required to be closely cropped. At the morning inspection, if the weather is mild, each boy must have his collar thrown back, his sleeves rolled up to the elbows, and the pantaloons to the knee. These inspections ought to be, and generally are, very searching; and as every boy is required to take a bath at least once a week, summer and winter, habits of personal cleanliness are instilled at the very outset of their career.

At eight o'clock, on the breakfast call being sounded, the boys "fall in" on the main deck by mess crews, are mustered by their respective captains, and, when the usual reports are made, the order is given, "Parade—rest!" At this command the boys uncover and stand at a "rest," while the chaplain offers a short prayer. It is a noticeable and very gratifying fact that, at the end of the invocation, the majority of the boys join in audibly repeating the Lord's Prayer. At the close of this brief service the order "Attention!" is given, followed by "March to breakfast!" when each captain faces his own crew and marches it to its proper mess-table. The same routine, save the prayer, is observed at dinner formation; and at supper an appropriate evening prayer is offered. It is at these mess formations that all general orders, details for duty, etc., are published.

Forty-five minutes are allowed for breakfast, when the hands are "turned to," and at nine o'clock the drum beats to "quarters." At this

signal the entire ship's company "fall in" at their proper stations at the guns. The gun's crews are mustered, and, at a call on the bugle, form for inspection; then the boys, their clothing and arms, and the guns and implements, are carefully inspected by the officers commanding the several divisions. The inspection over, and the divisions reported, the drum sounds the "retreat," when, if there is to be no exercise, the crews leave their guns and prepare for the next step in the daily routine.

The work is so arranged as to give to each department its fair share of instruction and lend variety to the whole.

It has been found by experience that the best results are obtained by dividing the year into two parts: first, for the winter routine, when the ship is moored at some naval station where there are facilities for work in the rigging and sail lofts, and for drilling on shore and under cover. The boys can then be instructed in company movements and the "School of the Battalion." It is found, also, that in the light and airy rooms such as are available at almost every navy-yard, the instruction in broadsword and boxing can be carried on much better than on the decks of the ship. The occasional change from the ship to places on shore is often very grateful to boys naturally restive under the confinement of ship-life. Experience shows, too, that it is better to accustom young lads to this radical change of life gradually. Hence it has been found very desirable to give at least one hour each day to the playground, whenever the weather and other circumstances permit, and encourage the boys to engage in pastimes and field-sports generally. Even if they only "skylark" and make a noise, it is better that they should be turned adrift on the playground frequently, as the open-air exercise has been found to be an important factor in the maintenance of discipline.

The long evenings of winter are generally devoted to amusement and popular lectures, and philanthropic gentlemen are often invited to address the boys. Two evenings in the week are given to singing. Under the leadership of a thoroughly practical instructor in vocal music, the apprentices soon acquire a readiness and precision in singing which, while it affords entertainment to their shipmates, is a source of endless amusement to themselves. Sacred melodies, naval and sea songs, and songs sentimental, humorous, and patriotic, all find a place in their *répertoire*.

If the exercises in singing afforded an innocent recreation simply, the practice might well be encouraged; but they do more. They exert a refining and elevating influence over even the roughest natures, and it has been observed that, after boys have been for some time in the singing-class, they drop altogether the coarse songs picked up in the lower resorts of city life, and adopt those better suited to ears polite.

Saturday evening is given up to dancing. A few musicians are allowed for this purpose, and it is interesting to observe how readily

these young sailors acquire a certain grace and *abandon* in treading the measures of the "mazy dance."

On the afternoons of Wednesdays and the forenoons of Saturdays the boys are required to muster at their guns, each with his bag of clothing. The bags are then opened, and the wearing apparel arranged on the deck for inspection. The divisional officers carefully examine every article of clothing, and see that it is in good repair, clean, and properly marked with the owner's name. On these occasions one gun's crew is sent to the ship's tailor, who instructs each member in the manner of measuring, cutting out, and making clothes. Besides this, there are two experienced seamen stationed at each gun, whose duty it is to instruct the boys in making, mending, and keeping in order every article of clothing worn by them. The seamen teach the boys of their squads also to wash their clothing, to "stop" them on the clothes-lines, to scrub their hammocks, and, in general, to take care of their persons and belongings. They embrace every occasion to instruct them in all the minor details of a seaman's duties. Once a month, at least, the bedding is aired and inspected. Each mattress is provided with two covers, one of which is scrubbed at the same time as the hammock.

On Sunday the boys are dressed in their mustering clothes,—their best,—and, after being carefully inspected by the officers at 9.30 A.M., they are marched to church on the "half-deck." From this attendance no boy is excused, except at the written request of his parents or guardian. In the afternoon there is a Bible-class led by the chaplain, assisted, perhaps, by a schoolmaster, and in the evening a "service of song," which consists of reading selections from the Bible, with brief explanations, singing hymns, in which the "Gospel Songs" form a large share, and prayer. In naval training-schools, as in every school in the land, there are found good, bad, and indifferent boys; but we venture to affirm that there are few secular schools where more time and care are given to moral culture.

Every boy takes his turn as cook of his mess. To teach him to prepare in the most palatable manner, and with the least waste, such food as the government ration provides, an experienced cook is detailed. A mess consists of seventeen boys (a gun's crew). Out of this number three rations may be commuted. The money value of a ration is thirty cents a day. If three rations are stopped, one is given to the cook of the mess as his perquisite, and the other two may be applied for the purchase of fresh potatoes, canned milk, raisins for "plum duff" or pudding, etc.

The government ration is regulated by act of Congress, and, though furnishing plain food, is yet abundant and wholesome. Every enlisted person in the navy is allowed per day 14 ounces of biscuit (hard-tack), 1 pound of salt beef (or 1 pound of pork, or ¾ of a pound of preserved meat), 4 ounces of sugar, and 2 ounces of coffee. In addition to this,

on Sunday, ½ a pound of rice, 2 ounces of butter, and 2 ounces of dried potatoes; Monday, ½ a pint of beans; Tuesday, ½ a pound of flour, 2 ounces dried fruit; Wednesday, 4 ounces of pickles, ½ a pint of beans; Thursday, 2 ounces of butter, 2 ounces dried potatoes, ½ pint molasses; Friday, ½ a pound of flour, 2 ounces dried fruit; Saturday, 4 ounces of pickles, ½ a pint of beans, and ½ a pint of vinegar. This is the regular issue at sea. In port it is varied by the issue, two or three times per week, of fresh beef, vegetables, and fresh bread (soft tommy). With a little care in the preparation of the food, and a judicious expenditure of the money drawn for commuted rations ($18 per month), the boys of the training-ships manage to fare pretty well. [The Department has recently recommended to Congress the following addition to the ration of naval apprentices: 4 ounces of oatmeal and 4 ounces of hominy on alternate days, and half a gill of molasses.]

Once a month there is a full-dress muster, at which the Articles of War are read, general orders published, etc. On these occasions the crew are required to be dressed in their mustering suits, and the officers in their full-dress uniform.

The winter routine, which lasts about six months, has been devoted to careful instruction in the rigging-loft, in the details of the great-gun drill, small-arms, "marline spike" seamanship, and the duties of topmen, as far as the latter can be taught by models, the free use of which is encouraged. But the winter routine is now over, and the leading boys are detailed as a crew for the tender, an old-fashioned sailing-ship. This they rig, prepare for sea, and, when ready, bid adieu to their comfortable winter retreat and seek their proper element, the broad ocean. Shoving out boldly from the coast, the practice-ship soon gets into the troubled waters of the Gulf Stream, and not a few of the young tars become sea-sick. This soon passes off, when they get their "sea-legs aboard," and, what is equally important, their sea-stomachs. They are now ready to emulate the example of the reckless Mr. Fid of the song, and

"Laugh at the force of the gale."

Now is the time for practical work, and to test the thoroughness of the instruction of the past winter. Clearing ship for action; general quarters, as preparing for actual battle; calling the crew to their guns in the dead of night, as if suddenly surprised by an enemy; night alarms of fires; sudden alarms of a "man overboard,"—all find their place in the sea routine.

The most valuable practice, however, is in firing at a target with the great guns, the ship being under canvas. Boys though they be, they find no difficulty in handling the IX-inch gun (the working gun of the service). The gun itself weighs in round numbers 9000 pounds, the

cartridge 13 pounds, the loaded shell 73 pounds, and the iron carriage 1200 pounds, making for the loaded gun a total (not counting the sight and side-tackle blocks) of 10,286 pounds; this total weight divided among sixteen boys, the crew of a IX-inch gun (not including the powder-boy), makes 643 pounds per boy. Constant drill produces concert of action, which, with the *élan* of youthful spirits, enables them to work these guns with remarkable rapidity.

For example, at a competitive drill at sea (the guns being properly secured for heavy weather), on the drum beating to general quarters, a IX-inch gun was cast loose, run in, loaded, run out, and fired,—the shell exploding,—all in *one minute and thirty-seven seconds!* In a competitive exercise to test the accuracy, combined with rapidity, of fire, a IX-inch gun was fired four times at a regulation target. The time of first fire being marked, the gun was loaded and fired three more times, and time called at the fourth fire,—in *one minute and forty-eight seconds!* The first shot struck and completely demolished the target (between 800 and 1000 yards distant), the remaining three shots being fired without much regard to accuracy. The time from the first to the fourth shot was, as stated, one minute and forty-eight seconds, giving *thirty-six* seconds as the time for loading and firing a IX-inch gun. On the third day of this series of exercises, the guns being secured for sea, the crews, without previous warning, were called to quarters a little after midnight, when a IX-inch gun, handled by enlisted boys, was cast loose, run in, loaded, run out, and fired (the shell exploding) in *two minutes and eight seconds* from the first tap of the drum! This would be called smart work anywhere. The superabundance of life and spirits with which the great majority of these boys are blessed needs only judicious direction in order to attain the highest results. The exercises aloft are conducted with the same spirit as the gunnery drills. Pulling in their boats, while it tends to great muscular development, is really a recreation. The ordinary routine of the ship is occasionally varied by boat expeditions, landing parties, etc. Hauling the seine is a source of great amusement.

When two or more of these practice-ships join company, the value of the exercises is wonderfully increased. A generous rivalry springs up among the several crews. Each ship, knowing that she is constantly watched and criticised by her consorts, is forever on the alert to keep everything "ship-shape and Bristol fashion." This spirit diffuses itself throughout the entire ship's company, from the captain to the youngest boy on board.

It may be remarked, in passing, that the above system of *both* winter and summer routine, with their appropriate instruction, has been found, in the experience of foreign navies as well as our own, to be the most judicious and practical combination for thorough and successful training.

It will be seen that American youths thus trained for the naval service are not only taught all the duties incident to man-of-war life, and attain a high degree of physical culture, but their moral nature is brought out and developed. The fact that a boy who, while on shore, was addicted to swearing will not swear in the presence of an officer is a pregnant truth. It demonstrates the possibilities of self-restraint. Since it is possible for the most hardened boy to exercise that amount of self-restraint, it is certainly possible to cultivate that virtue in the average boy. This is the great aim of discipline; and just so far as we succeed in that cultivation do we succeed in improving the moral nature of the boys, and preparing them to be better men. This is the true method of elevating the moral tone of our seamen.

Besides exacting prompt and cheerful obedience of orders, the school regulations require the boys to abstain from profane or obscene language, and from the use of tobacco. This necessitates a complete subordination of their will to the will of those legally placed over them; and, secondly, such rigid self-government as will not expose them to the penalties which inevitably follow the infraction of the rules. Willful boys, and such as have been habitually neglected by their parents, are naturally very restive under a system so radically different from that which they were indulged in at home. But, finding that the rules are inflexible, and that they must either yield or go under, the great majority of the boys prefer the former. If the boy refrains from the violation of the regulations, he can, by judicious treatment, be brought to refrain in secret,—in fine, to refrain altogether; and when we have done this we have arrived at a point in his education which is as important and worthy as any of the branches of learning laid down in the curriculum of our public schools. The boy feels now that he has gained a certain mastery over himself and his appetites: his training has given him a strength of will which enables him to offer a certain amount of resistance to temptation in any form. He cannot now be betrayed by his more reckless shipmates into mutinous conduct. In times of danger he is self-contained, and he finds an inward strength to withstand the vicious allurements of social life. *This* is Education; this is the *leading out*, the developing, of the God-given qualities in man, as the word itself implies.

Boys who are hopelessly bad, and set themselves persistently against the discipline of the ship, are summarily dismissed.

We do not say that all this is actually accomplished in the training-ship. Two years being the utmost limit of time in that school, little more than a beginning can be made. Hence the necessity of the cruising-ship, to which he is transferred, keeping up and carrying on the system commenced in the training-ship. Hence, too, the necessity of taking these boys at an early age. If we took boys at twelve years

of age we would find them comparatively free from the vices commonly contracted on shore; more impressionable, more readily imbued with the spirit of the service, and far more likely to remain in the navy after becoming of age, which is, after all, the great desideratum. But the increased expense consequent upon the longer course of training is thought to be an insuperable objection to that early age. Experience shows that fifteen is a better average age; therefore the limits of the age of admission should be fixed at fourteen and sixteen, as giving the best results.

It has been suggested that the discipline and daily routine of a man-of-war ought to be dispensed with on board the training-ship, as it interferes too much with school hours. "You cannot," it has been sententiously remarked, "keep up a man-of-war and a school-ship at the same time." There is just enough *vraisemblance* in the statement to carry conviction to the mind of the superficial observer; and, had the training system some other object in view than its own obvious and legitimate end, it would be altogether true. If the government desired, for example, to add to our public-school system a nautical branch where youths could, besides acquiring a good English education, learn from books the duties of a seaman, we might dispense entirely with the ship's routine of duties. It would be better in that case to have the ship divested of her masts and boats, and housed over, like the old "Vermont"; or, better still, to put the apprentice boys in barracks on shore, so that they would not have their studies interfered with by ship's work of any description. They would then enjoy well-ventilated recitation-rooms, and have desks to sit at, and, better than all, ample blackboards wherewith, by the aid of diagrams, they could the better make their recitations. This entire change of base would be the natural and inevitable result of any attempt to eliminate from the training-school the duties common to every ship of war; but such a system would not make *sailors*.

The captain of a ship fitting out for a foreign station will, on receiving a draft of boys from the training-school, expect them to fall into their places at once, and aid in the work of fitting out. One boy out of every twelve or sixteen must commence at once as cook of a mess; he should therefore be familiar with the duties. Not even a knowledge of conic sections would compensate his messmates for bad meals. The divisional officer will expect the boys assigned to his guns to be perfectly familiar not only with the details of the drill, but with the method of keeping the guns and their implements in the very best order. The executive officer will expect them to be fair topmen, and, according to their experience, much that that term implies; to know how to keep their boats in order, and generally to perform, intelligently and promptly, the great majority of the various duties of the ship. If these reasonable expectations are not fulfilled, the training-ship has

failed in its mission. Now a knowledge of these duties can be acquired only by keeping up, on board the training-ship, the regular routine of a man-of-war in active service; and not only this, but the apprentice should be broken in, at the very outset, to a conscientious performance of his duties and to a thorough state of discipline. The exercises and drills of the training-ship should be the standard of excellence throughout the service,—the ship itself a model of good order and efficiency. If it be a question then between ship's routine and recitations, we unhesitatingly say, "Let the latter be dispensed with!" The school-ship, to succeed, must be a school of practice. But experience has shown that a judicious blending of ship's duties and studies is possible, so that neither need be thrown out. It is well known that on board of a well-disciplined ship exercises are carried on, and everything is kept in beautiful order, while the crew have plenty of spare time on their hands. It is this "spare time" that, on board the school-ship, is devoted to studies.

S. B. Luce,
Captain U. S. Navy.

THE EXAMINATION OF OFFICERS IN THE NATIONAL GUARD.

THE subject of examination of officers in the National Guard is one which does not admit of any very great breadth of treatment. The principal points to be remarked upon can be condensed into a few paragraphs. It is nevertheless an important matter and one which at the present time is exciting some attention among military men in the militia. To those acquainted with the real wants of the service, the necessity which exists for reform in some important particulars is very apparent. Deplorable and inexcusable ignorance, not only of the tactics, but more particularly of the elementary requirements of discipline and the ordinary duties of a soldier, has been displayed at times in quarters where it ought not to have been expected. It is desirable that in the future no man shall be intrusted with a command, or be permitted to hold a commission in the National Guard, unless he is fully qualified to perform the duties appertaining to the position. The proper examination to which an officer should be subjected will necessarily depend very largely upon the rank he holds, for the reason that the duties appertaining to the successive grades are diverse. A colonel of infantry, besides being thoroughly acquainted with the tactics, should exhibit a more extended knowledge of military matters generally than a captain. Examining boards should carefully avoid propounding merely tactical puzzles to any officer; the most efficient men may under such circumstances become confused. It should be remembered that the object in view is to ascertain the general fitness of an individual for the practical duties of the position which he is to occupy. I should say that the examinations of the captains and colonels should be the most severe and exacting, for the reason that the officers filling these positions are required to instruct subordinates in their various duties. A captain of infantry, besides being acquainted with that portion of the tactics relating to the drill of the company and battalion, should also be conversant with the duties of the lieutenants, sergeants, corporals, and privates. A colonel of infantry, besides being proficient in the tactics relating to the company, battalion, and brigade, should have a thorough knowledge of the duties of each man in the regiment, from the private up to the officers of his own grade. This is necessary, in order that he may

be able to instruct them and observe that they perform their duties properly.

Besides a knowledge of the duties of his position proper, it may be said that an officer should be acquainted generally with the duties of the position immediately above the one he occupies, as an emergency may arise at any moment which may necessitate the performance of duties belonging properly to the grade above him. All officers should be expected to have a general knowledge of the Articles of War. These important rules for the government of the armies of the United States are not only applicable to the Regular Army but also to the National Guard, when called into service. I am also of the opinion that a beneficial effect would be obtained if these Articles were "read and published once in every six months,"[1] to every regiment, troop, and company mustered into the service.

Artillery officers should be acquainted with the different kinds of guns in use, and the various kinds of ammunition proper to be used under different circumstances. They should also possess a knowledge of the different parts of the gun-carriage, limbers, caissons, harness, etc., and be conversant with the proper method of treatment of the horses attached to the battery.

Infantry officers should be thoroughly acquainted with the different kinds of arms and equipments used in their branch of the service, and should appreciate the effect produced by the fire of troops armed with the improved modern breech-loading rifles.

Cavalry officers, besides their other duties, should understand the use of the sabre, carbine, and revolver, and the care of the horse; and all officers should be examined upon points relating to discipline, and the treatment and management of men.

It may be said that what an officer is expected to know is not to be derived entirely from books, but partly from observation and from information derived from others, and from experience as a soldier. A colonel or captain should be acquainted with many things relative to the management of troops which cannot be learned from books. Under no circumstances should the examination be merely perfunctory. It should touch upon every subject necessary to make a careful and efficient officer.

RUSSELL THAYER.

[1] Art. 101, Articles of War.

A CHAPTER FROM THE HISTORY OF OUR ARMY.

"In 1855 Congress passed a law authorizing the formation of two new regiments of cavalry, and Mr. Jefferson Davis, then Secretary of War, took advantage of the fact that they had not been designated by the title of dragoons to treat them as a different arm, and to fill them with his creatures, to the exclusion of regular officers whom he disliked."—*History of the Civil War in America.* Comte de Paris. Vol. i. p. 24.

"It was no doubt intended to make the dragoons and cavalry all one arm, but a fault in the law, which was subsequently remedied, made it otherwise, and Jefferson Davis, who was Secretary of War, took advantage of it and made two arms, thereby securing promotion for his favorites in the cavalry arm without reference to the dragoons."—*History of the United States Cavalry.* Major Brackett, U. S. Army. P. 140.

THE first official suggestion that an increase of the army had become necessary seems to have been made by Brevet Lieutenant-General Winfield Scott in his report of operations for the year 1853. After alluding to the marked increase which the Indian frontier had undergone since the close of the Mexican war, and to the necessity of establishing garrisons for the protection of the newly-opened Oregon route, he urgently recommended that the army should be increased by the addition of at least two regiments of dragoons and two regiments of infantry.

The Secretary of War devoted a considerable portion of his annual report for the same year to a careful review of the frontier question, giving especial prominence to the fact that, while the strength of the army had remained fixed, the duty required of it had been nearly doubled; and, while agreeing with General Scott as to the necessity of an immediate increase of the strength of the army, it does not seem that he fully coincided with him in his opinions as to its exact extent.

The war with Mexico had resulted in adding nearly one-third of the continent to the Federal domain, and the government was bound, in the interest of civilization, to open this immense area to settlement. California, by reason of her rich deposits of gold, soon solved the problem without requiring much assistance from the army. While the Indians were numerous in that State, they were not warlike, and they soon conformed themselves to the new order of affairs. But all the country between the Missouri River and California was an almost

unknown land, occupied by powerful and warlike tribes of Indians; just enough was known of it to convince all that States would be erected there, and that a vast empire, in the interest of freedom, would be created in the near future. The army was to lead the van in this work, not accomplishing it, of necessity, through wanton bloodshed, but by its intelligence, loyal devotion to law, and untarnished integrity, to set an example to the wild spirits who hastened to the boundless prairies and mountain regions of that section, and in the assistance it was always ready to extend to the civil authority in the discharge of its duties.

These recommendations, however, were not heeded by either branch of Congress, and the session terminated without any important legislation.

General Scott was never regarded as attaching much importance to cavalry, although he frequently bore testimony to the valuable services rendered by it; and in 1855 he was strongly in favor of raising two regiments. It may be remarked here that, when the war of the Rebellion commenced, cavalry was practically ignored; so much so that, when the Federal troops first crossed into Virginia, but three companies belonging to the old Second Cavalry accompanied them. Long before that war terminated the cavalry had proved itself, under the leadership of able officers, of the utmost importance, and capable of achieving grand results not alone on the far frontier, but also as attached to corps and in operating in the enemy's country, while a few of the out and out cavalry fights—notably Beverly Ford—will ever remain conspicuous in the annals of the struggle for the preservation of the union of the States.

Mr. Davis, in his annual report for 1854, again urged upon the attention of Congress his recommendations of the preceding year, and asked that the strength of the army might be increased by adding to it two regiments of *cavalry* and two regiments of infantry.

The President (Franklin Pierce) in his annual message dated December 4, 1854, asked for a favorable action upon the recommendation of the Secretary of War, as follows:

"The valuable services rendered by the army, and its inestimable importance as the nucleus around which the volunteer force of the nation can promptly gather in the hour of danger, sufficiently attest the wisdom of maintaining a military peace establishment; but the theory of our system and the wise practice under it require that any proposed augmentation in time of peace be only commensurate with our extended limits and frontier relations. While scrupulously adhering to this principle, I find in existing circumstances a necessity for an increase of our military force, and it is believed that four new regiments—two of infantry and two of mounted men—will be sufficient to meet the present exigency. If it were necessary to weigh the cost

in a case of such urgency, it would be shown that the additional expense would be comparatively light."

General Scott was called before the House Military Committee, and in reply to the question asked him by the chairman, "What should be the strength of our army in view of our extended seaboard, foreign frontiers, and prospective relations with Indian tribes?" said,—

"The increase of the strength of the army as provided for by the bill submitted by the War Department, now under consideration by this committee, I deem highly necessary. The bill proposes that there shall be two additional regiments of infantry and two of *cavalry*. This is, I consider, the minimum force that is essential to be added to the army to protect the frontiers against the hostilities of the Indians,—the present force on the frontiers being entirely inadequate for that purpose. In Texas the Indian hostilities have been more destructive than at other points, principally on account of the small force stationed in that country. The troops are constantly engaged in encounters with the hostile Indians, and the loss of men when successful is always in the inverse ratio of our inferior numbers. Hence the proposed increase simply in reference to Indian frontiers seems to be dictated by considerations both of policy and humanity, in order that adequate protection may be afforded to our border inhabitants without a useless sacrifice of our brave detachments. The increase proposed of two regiments of infantry and two regiments of *cavalry*, organized like the present force, and characterized by the like zeal and activity, would, in my opinion, give reasonable protection to our frontiers and overland emigrants."

There seems to have been no difference of opinion in Congress as to the imperative necessity for an increase of our military force, although there were radical differences of opinion as to its precise nature. Schemes for raising mounted bodies of volunteers, of varying strength, and for longer or shorter terms of service, were brought forward and met with considerable favor. A proposition for an increase made up of regulars and volunteers had many supporters.

The Army Appropriation Bill, which had passed the House on the 27th of December, 1854, was reported to the Senate from the Committee on Ways and Means on the 9th of January, 1855, and nearly one month later Mr. Hunter offered an amendment to the bill, authorizing the organization of two regiments of *cavalry* and a force of five hundred mounted volunteers, which latter was to serve for twelve months. Mr. Shields offered a substitute for this amendment, authorizing the President to add to the strength of the regular army two regiments of *cavalry* and two regiments of infantry, which were to be organized in the same manner as the existing regiments. This was agreed to,—31 ayes, 20 noes. An amendment offered by Mr. Brown, providing for a force of three thousand volunteers to serve for eighteen months,

was not agreed to, and the bill containing the Shields substitute was passed.

The bill as thus amended by the Senate came up in the House on the 2d of February, 1855, and, after a long debate, extending to the 2d of March, it was passed on that day,—121 ayes, 61 noes. It was signed by the President on the 3d of March, 1855.

The following is the text of the section under consideration:

"SECTION 8. There shall be added to the army two regiments of infantry and two regiments of *cavalry*, organized as in the existing form, . . . and that officers and men authorized by this act shall be entitled to the same provisions for widows and children and the same allowances and benefits, in every respect, as are allowed to other troops composing the army of the United States. They shall be subject to the Rules and Articles of War, and the men shall be recruited in the same manner as other troops, and with the same conditions and limitations."

It would be quite entertaining, if within the scope of this article, to follow the debate had in Congress upon this measure before it became a law. It may be stated, however, that the Secretary of War not only proposed to raise these regiments, but he also proposed to introduce certain reforms into the service, namely, a system of promotion by merit, as well as by seniority; to add surplus officers to the regiments, who were to be employed on civil works; and to abolish the permanent staff organization, substituting in lieu thereof details from the line for staff duty.

Those who opposed the measure generally displayed bitter hostility toward the army. One speaker said that our officers were "school-house officers," and that our enlisted men were "pot-house soldiers." Another speaker said that the day for any large body of Indians to assemble for hostile purposes had gone forever; while another denounced the measure as a scheme to furnish places for the graduates of the Military Academy, for the friends of the Secretary of War, and ultimately to obtain, by conquest, the island of Cuba, while the general argument pressed with the greatest of persistency by the opponents of the measure was, that the regular officers and enlisted men were not fitted by education to deal with the Indians. The sound argument brought out in favor of the measure was, that the Indians ought not to be fought by those who, by living on the frontiers, were prejudiced against and would cruelly deal with them whenever opportunity offered; that it would be an act of inhuman cruelty towards the Indians, unworthy of a civilized nation, to intrust the conduct of hostile operations in the hands of men, residing upon the frontier, whose bitter prejudices unfitted them for the proper performance of so delicate a duty; while, on the other hand, the government was bound by every consideration of justice and honor to interpose between the settlers and the Indians

an impartial body of men, whose duty should be to protect not only the settlers from depredations, but also to defend the Indians from unlawful and unauthorized aggressions. The speeches made were generally against the measure and in favor of volunteers. It was passed by a voting, not a talking, majority.

A reading of the foregoing summary will show that the Comte de Paris and Colonel Brackett are in error in their statements concerning the law under which these regiments were organized. It was purposely intended that two regiments of cavalry should be raised and maintained as a separate arm of the service, precisely as the dragoons and mounted riflemen were then maintained as separate arms. The organization of the cavalry regiments made promotions in the infantry, dragoons, and mounted rifles. General Rodenbough, in "From Everglade to Cañon with the Second Dragoons," says, "The War Department caused boards of examination to convene at the headquarters of the several regiments affected by the change to test the fitness of the young officers appointed directly from civil life, and the utmost care was taken to make the new regiments creditable in every respect to their patron, Secretary Davis, with whom this arm of the service was a favorite."

An act of Congress of the 3d of August, 1861, consolidated all mounted regiments with one corps, to be known as cavalry. The First and Second Dragoons became the First and Second Cavalry. The regiment of mounted rifles became the Third Cavalry. The old First and Second Cavalry became the Fourth and Fifth Cavalry, and the new Third Cavalry (organized in May, 1861) became the Sixth Cavalry.

The assertion that the regiments were filled with the creatures of Secretary Davis is a fatal mistake, as the record will abundantly show. Not all of the Southern-born officers appointed in these regiments joined the Rebellion. Quite a number of those who did so were appointed during the years following their organization and preceding the war of the Rebellion. They joined during that period (as officers join now) by their own selection, in so far as their class standing gave them that privilege.

Of the officers first appointed to the First Cavalry (present Fourth) the lieutenant-colonel (Joseph Eggleston Johnston), four captains (William D. De Saussure, William S. Walker, William N. R. Beall, and George H. Steuart), five first lieutenants (James McIntosh, Robert Ramson, Jr., Alfred Iverson, Jr., Philip Stockton, and James E. B. Stuart), and two second lieutenants (Richard H. Reddick and John R. Church) resigned their commissions and joined the Rebellion against the United States,—a total of twelve.

The officers who remained on the Union side were the colonel (Edwin Vose Sumner, outspoken in opposition to slavery before he was appointed to the position; so much so that his opinions upon this subject were generally known throughout the army), the two majors (Wil-

liam H. Emory[1] and John Sedgwick), five captains (Delos B. Sacket, Thomas J. Wood, George B. McClellan, Samuel D. Sturgis, and Edward W. B. Newby), four first lieutenants (Eugene A. Carr, David Bell, Frank Wheaton, and David S. Stanley) and five second lieutenants (Elmer Otis, James B. McIntyre, Eugene W. Crittenden, John A. Thompson, and Albert V. Colburn),—a total of seventeen.

Of the officers who were assigned to the regiment during the years 1856–60, both years inclusive, five second lieutenants (Edward Ingraham, Lunsford L. Lomax,[2] Oliver H. Fish, Andrew Jackson, Jr., and John R. B. Burtwell) resigned their commissions and joined the Rebellion, and four second lieutenants (Eli Long, George D. Bayard, Joseph H. Taylor, and Charles S. Bowman) remained on the Union side.

Captain George T. Anderson, First Lieutenants John N. Perkins and Harry Love, and Second Lieutenants William A. B. Jones and Hartford T. Clarke, resigned, etc., *ante bellum*. Four Northern-born officers joined the Rebellion, namely, Walker, Stockton, Ingraham, and Lomax. Stockton was born in, and appointed from, New Jersey. Walker was born in Pennsylvania. Lomax was born in Rhode Island, and both were appointed from the District of Columbia. Ingraham was born in Pennsylvania, and was appointed from Mississippi. Seven of the Southern-born, Emory, Wood, Newby, McIntyre, Crittenden, Long, and Taylor, remained on the Union side.

Of the officers first appointed to the Second Cavalry (present Fifth), the colonel (Albert Sidney Johnston), the lieutenant-colonel (Robert E. Lee) the senior major (William J. Hardee), two captains (Earl Van Dorn and Edmund K. Smith), three first lieutenants (Nathan G. Evans, Charles W. Field, and Walter H. Jenifer), and five second lieutenants (John T. Shaaff, George B. Cosby, John B. Hood, Joseph F. Minter, and Charles W. Phifer) resigned their commissions and joined the Rebellion against the United States,—a total of thirteen.

The officers who remained on the Union side were the junior major (George H. Thomas), five captains (James Oakes, Innis N. Palmer, George Stoneman, Jr., Albert G. Brackett, and Charles J. Whiting), five first lieutenants (Richard W. Johnson, Joseph H. McArthur, Kenner Garrard, William B. Royall, and William P. Chambliss), and one second lieutenant (William W. Lowe),—a total of twelve.

First Lieutenant Robert Nelson Eagle resigned on the 15th of January, 1862, and did not thereafter participate in the war on either side. He was born in New York, and was appointed from Texas.

Of the officers who were assigned to the regiment during the years 1856–60, both years inclusive, five second lieutenants (James P. Major,

[1] Emory was appointed a major in the Second Cavalry, 3d March, 1855. Transferred to the First Cavalry, 26th May, 1855.

[2] Lomax was assigned to the Second Cavalry a brevet second lieutenant, 1st July, 1856. Promoted second lieutenant First Cavalry, 30th September, 1856.

Fitzhugh Lee, Manning M. Kimmel, George A. Cunningham,[3] and Wade H. Gibbes) resigned their commissions and joined the Rebellion, and five second lieutenants (James E. Harrison, A. Parker Porter, Wesley Owens, Abraham K. Arnold, and John J. Sweet) remained on the Union side. Seven of the Southern-born, Thomas, Johnson, McArthur, Garrard, Royall, Chambliss, and Harrison, remained on the Union side.

Captains Theodore O'Hara, William R. Bradfute, and Charles E. Travis, First Lieutenants Alexander H. Cross and Charles Radzminski, and Second Lieutenants George Hartwell, Robert C. Wood, Jr., James B. Witherell, Cornelius Van Camp, Junius B. Wheeler, and John T. Magruder[4] resigned, died, etc., *ante bellum*. O'Hara, Bradfute, and Cross afterward participated in the Rebellion against the United States; Travis, Radzminski, Witherell, and Magruder died; and Van Camp was killed in action prior to the war. Wheeler is now a professor at the West Point Military Academy.

There were sixty-nine officers appointed in the two regiments at date of organization,—twenty-seven from the free States, and forty-two from the slave States; and assigning them according to the *status* of the several States during the war of the Rebellion, only twenty-eight were appointed from the seceded States.[5] A total of thirty-eight officers of the ninety named as belonging to the two regiments from their organization to the commencement of the war are known to have joined the Rebellion. Fifty of the seniors had received their baptism of fire; fully thirty had won fame in the Mexican war, and nearly all of the younger officers had participated in Indian combats in the West and the Southwest.

Of the officers who joined the Rebellion, Albert S. Johnston, Robert E. Lee, Joseph E. Johnston, Hardee, Van Dorn, Edmund K. Smith, Stuart, Field, Jenifer, Hood, Major, Fitzhugh Lee, and Kimmel attained the grade of general officers; and, with few exceptions, all of the others gained field-officers' commissions. On the Union side, Sumner, Thomas, Sedgwick, Emory, Oakes,[6] Palmer, Stoneman, Jr., Sturgis, Wood, McClellan, Carr, Wheaton, Stanley, Johnson, and Garrard attained the grade of general officers; and, with but few exceptions, all of the others gained field-officers' commissions.

The simple fact that many of these officers had Mexican war records, and that nearly all of those named had seen Indian service, and had met in conflicts one of the most formidable foes ever encountered on the field of battle, together with their subsequent records on both

[3] Cunningham was assigned to the First Cavalry a brevet second lieutenant, 1st July, 1857. Promoted second lieutenant Second Cavalry, 1st October, 1858.

[4] Magruder was assigned to the Second Cavalry a brevet second lieutenant, 1st July, 1857; transferred as such to the First Cavalry, 24th April, 1858.

[5] Army Register, 1st January, 1856.

[6] Declined appointment of brigadier-general volunteers, 17th May, 1861, on account of ill health caused by a wound received in action.

sides of the gigantic struggle of 1861–65, marked by the tenacity and the stubborn energy of both combatants, answers the assertion that such officers could be creatures for any man, no matter what his name or what position he occupied. The names of nearly all of those officers who remained on the Union side became household words in Northern homes during the war; while many of those who went South gained equal distinction in their section. It was not possible for such men to be the creatures of any man; but their careers, both North and South, prove how great was the care exercised in the assignments to the cavalry regiments. It was well known and universally admitted by all in the army in 1855, and by those then familiar with the service, that no other regiments could boast of a better average. It is a historical fact that the officers then selected were superb soldiers, and that they were from the best in the army.

GEO. F. PRICE,
Captain Fifth U. S. Cavalry.

FORT MCKINNEY, WYOMING, 23d April, 1879.

NAPLES.

"Vedi Napoli e poi mori."—*Proverb.*

One happy lustrum gone,
Sweet, since our bridal dawn,
Stand we at top of all bliss, you and I?
Here, by this lovely strand,
Now may we understand
That which was meant by,—"See Naples and die?"

Yonder moon, five days old,
Type of our years of gold,
Saith, "Through more phases of glory I move!"
Haply some fairer coast
Smiles at Italia's boast:
There is no climax to Beauty or Love.

Yet have we reached a height
Far toward the Infinite,
In the Olympic delight of to-day.
On Mount Saint Angelo
We were crowned long ago
Lady and lord of this luminous bay.

This is no bitter brine:
Fragrant its bowl, with wine
Mantling, the Mediterranean flows;
Foam-flowers of rapture fine,
From passion's depths divine,
Crush through all purples from violet to rose.

Nature's extravagance,
Fable's inconsequence,
Here hold high carnival, motley of hue,
Which, by the right of love,
In the sweet light of love,
We will enjoy and interpret anew.

These were the Siren's seas:
Once did Parthenope's
Melodies lure to these headlands and isles.
Younger-born Maiden Face!
Charm me with wifely grace!
Sing me the song that but sorrow beguiles!

Come, let our spirit-boat,
Floating to peaks remote,
Ripple old music that slumbers in air!
Warmed with old sunshine, glow
Happy Posilipo,
Haunted blue Capri, Sorrento the fair.

Down from Camaldoli,
Dead sunsets luridly
Brood o'er the phantom-world Virgil hath sung.
But, behold! Cuma old,
And Baia's beach of gold,
Where the Sun walked when the Sibyl was young!

From dark Avernus' ceil,
Not for an oracle,
One little Sibylline leaf we demand.
Tell us, O mystic maid!
All that Apollo said,
Offering his love, or—a handful of sand!

Sand numbering years by grains,
If vowed to sterile pains,
To the stern knowledge that pleasure denies.
Wouldst thou so choose again?
Love's briefer lot disdain?
Love's sweet unwisdom? Death only is wise.

Different our choice. From sleep,
Fountains Pompeiian, leap!
Voices of waters, repeople the halls!
Chant dithyrambic songs,
Clash corybantic gongs,
Float, O ye nymphs, from your arabesqued walls!

Bacchanal girls and boys,
All the past loves and joys,
Bright from mosaic and frescoed decay,
Join hands in merry round!
We will be myrtle-crowned,
We will be gods in our gladness to-day!

Smile even you for us,
Sullen Vesuvius!
Shake out white banners of smoke to the sun!
Earth's heart be jubilant,
Earth's face be celebrant,
Ocean and Air flow empurpled as one!

Ah! we are egotists,
Flattered by rosy mists,
We are but childish fools, Sweet, you and I.
Yet is Love's folly bliss:
So crown him, kiss on kiss!
Yea, though we drain supreme rapture—and die!

WILLIAM GIBSON,
Commander U.S.N.

PROBABLE CAUSE OF THE EXPLOSION OF THE 38-TON GUN ON BOARD H.M.S. "THUNDERER."

No incident connected with modern armament has excited more interest in England than the explosion of the 38-ton gun on board H. M. S. "Thunderer."

It was hard to realize that a gun regarded as one of the best and most powerful in the naval service had burst in simple practice with a comparatively small charge of powder and an empty common shell.

It is not necessary to repeat the published conflicting expressions of opinion as to the cause of the disaster. Upon one point, however, all concurred: unless a rational explanation could be given, distrust and apprehension would attend the employment of the weapons upon which above all others reliance had been placed.

The first solution, proposed by a committee of naval officers, that an unoccupied space between the projectile and the powder caused the explosion, was by a second committee, composed of three officers of the navy and three officers of Royal Artillery, rejected; for experiment had shown that such air-space would have diminished the intensity of pressure of the gases.

The finding of a cause then devolved upon the second committee. Conceiving that a *double* charge would have sufficed to produce the explosion, and that possibly the gun contained a double charge, the second committee attributed the explosion to that cause. This finding is not in accordance with the evidence of witnesses, which goes to show that the gun contained but a single charge.

It is not necessary, however, to seek far for a cause sufficient to produce the explosion, without detracting from the strength of the gun or the professional skill and training of those whose lives were lost by an explosion to which, it may be shown, the strongest guns are liable with but a single charge of powder and an empty common shell. One of those simple things which, like the real effect of an air-space, has not been given due weight.

In view of the importance now attributed to the air-space, it may be interesting to sketch briefly the development of its effect and utility in the service of heavy guns.

In 1844, Captain Alfred Mordecai, U.S.A., in a report of experiments in gunnery made by him at the Washington Arsenal, called the attention of the Ordnance Department to some important results of experiments made at Metz, in the following words:

"The experiments of the board of officers at Metz, whose report I have mentioned in the beginning of my journal, show that with charges exceeding one-fourth the weight of the ball, the cartridge of diminished diameter has even the advantage in point of force, and this circumstance assumes great practical importance when taken in connection with another fact developed by numerous experiments in France, viz., *that by reducing the diameter of the cartridge the strain on the gun may be greatly diminished.*

"In order to prevent the very rapid destruction of brass siege-guns, which is caused by the use of large charges, Captain Piobert proposed, in a memoir written in 1833, to increase the space in rear of the ball by diminishing the diameter of the cartridge, or by interposing an elastic wad between the powder and the ball. Although the range of my experiments did not allow me to verify these results, I have permitted myself to make the foregoing remarks on the French experiments in order to call the attention of the Ordnance Department to a matter which may be of the greatest importance to us in reference to giving increased durability to our iron guns, and diminishing the risk of accidents which have been lately of frequent occurrence from the bursting of these guns."

When in charge of the Naval Ordnance Department of the Confederate States, I was endeavoring to make the most effective use of the comparatively slender means at command; I gave due weight to the opinion of Captain Mordecai as thus expressed, and applied the principle to the fullest extent permitted in guns of the common form of bore and chamber, with good results. All such explosions as occurred with navy rifles of cast iron, reinforced by from one to three series of concentric wrought-iron bands, were due either to non-compliance with instructions or to defective castings. In 1863 there were received for the land service two 12¾-inch rifles of peculiar form and construction, designed by Captain Blakely. They were of cast iron,—two concentric tubes, reinforced for a distance of 20 inches over the forward part of the chamber and bottom of bore by a series of four steel bands 6 inches thick. The breech-piece (permanent), of bronze, contained the chamber, which, with a diameter of 6.2 inches, was 26 inches long, opening into the bore, 12¾ inches diameter, and 12.6 feet long. The vent entered the mouth of the chamber.

No instructions as to mode of loading were received; the intentions of Captain Blakely were wholly unknown. After consultation the artillerists at Charleston decided that one of the guns should be loaded in the usual way and fired. It exploded at the first discharge. Va-

rious suggestions were then made as to what should be done with the remaining gun, in which no confidence was placed. On looking at a sketch of the fractured gun, sent for inspection by the Naval Ordnance officer, Lieutenant Van Zandt, at Charleston, it occurred to me that Captain Blakely, in order to reduce the tension of the gas in accordance with the physical law, *pressures of gases inversely as volumes*, while the shot was being started from a state of rest, had designed the chamber to serve as a *gas-chamber*, the cartridge to be placed in the bore of the gun, its rear end at the mouth of the chamber; and that so charged the remaining gun might prove useful. Without delay I made these views known, through the Secretary of the Navy, to the President, suggesting that the remaining gun should be so charged, using No. 11 navy powder, and fired. By him the suggestion was referred to Colonel J. Gorgas, chief of army ordnance, who called upon me for the grounds of my opinion, which I gave. The experiment was by his direction then made by a board of army officers, with the following results, as communicated by Lieutenant Van Zandt:

"Experiments with 12¾-inch Blakely rifle at Charleston, S. C., October 2, 1863:

1st charge,	30	lbs.	Army	Columbiad,	1	shell.	
2d	"	35	"	"	"	"	"
3d	"	40	"	No. 11	Navy,	"	"
4th	"	45	"	"	"	"	"
5th	"	50	"	"	"	"	"
6th	"	55	"	"	"	"	"

"Elevation 2¼°, fired from R. R. Flat, upon which it was lashed. Gun examined after every fire; no strain discovered. The charge was placed between the gas-chamber and base of shell."

This result, so completely at variance with the prevailing theory, that space in rear of the shot greater than that resulting from the regulation diameter of cartridge increased the strain upon the gun, and so important in connection with the construction and service of large guns of the future, excited great interest, and in March, 1864, a board of artillery officers, Colonel George W. Raines, President, engaged in "determining matters in connection with the service of artillery in general," made at Augusta Arsenal experiments to solve the following question:

"The use of the air-space in artillery involves the necessity of placing the projectile farther towards the muzzle, or of allowing an interval between it and the charge. What is the maximum that can be safely allowed, or is there any danger to the gun by thus displacing the projectile from its usual position resting against the charge?"

"The principal gun used was a 7-inch columbiad, carrying a bolt of one calibre in length with a windage of .05 inch, and weighing 65

pounds. This bolt at its end nearest the charge had a recess about 1.5 inch broad, which was wrapped with lubricated cloth, and thus the bolt fitted the gun practically without windage and corresponded more nearly to a rifle-gun."

With it the following results were obtained:

Number of Fires.	Kind of Powder.	Diameter of Cartridge.	Packed or Loose.	Pounds.	Weight of Projectile.	Diameter of Projectile.	Calibre of Gun.	Initial Velocity.	Pressure per Square Inch.	Extent of Air-space.	Remarks.
									Lbs.	*In.*	
2	L. C.	6.95	Packed	8	65	6.95	7-in.	1265	80.079	0	
3	"	6.5	Loose	"	"	"		1251	67.249	1	
3	"	6	"	"	"	"		1120	46.000	2	
3	"	6.9	Packed	"	"	"		1176	35.182	3½	
5	"	"	"	"	"	"		1071	22.165	5	
2	"	"	"	"	"	"		1020	14.000	8	
1	"	"	"	"	"	"		775	6.253	30	
2	"	"	"	"	"	"		579	4.903	52	
3	"	"	"	"	"	"		.....	2.414	.....	Bolt 2 calibres from muzzle.
											Powder, Grains.
2	S. C.	6.95	"	"	"	"		1344	69.619	3½	.12 in. diameter.
3	L. C. 4	"	"	12	"	"		1328	43.361	7	.4 " "
3	"	"	"	12	"	"		1312	38.274	9	.4 " "
4	"	"	"	10	"	"		1288	49.434	3½	.4 " "
5	L. C. 3	"	"	11	"	"		1272	37.896	3½	.6 " "
3	L. C. 2	"	"	11	"	"		1272	24.717	3½	.87 " "
	Pressure at each extremity of a long air-space.										
2	L. C.	6.95	Packed	8	65	6.95		579	4.903	52	Piston at charge at breech.
1	"	"	"	"	"	"		685	5.151	52	Piston at projectile.

The report continues: "In the series of experiments undertaken to elucidate this subject with the different guns at the disposal of the board, the fact was clearly established that the common opinion as to the danger incurred in the displacement of the projectile from the charge is without sufficient foundation. That the maximum strain on the gun is experienced when the projectile is closely rammed home at the charge, the latter being packed and fitting the bore. That in proportion as the projectile is removed from the charge towards the muzzle the strain decreases, and is at its lowest point when it is at or near the muzzle itself. Thus 2 pounds of small cannon-powder has been repeat-

edly fired with three balls placed within two calibres of the muzzle of the 6-pounder; also, several charges of the same weight of powder, and the ball wrapped with cloth and driven tightly to the same distance from the muzzle. In all these cases no injury whatever was experienced by the gun.

"Again, the 7-inch with 8 pounds large cannon-powder, with the bolt of 65 pounds tightly fitting the bore, the average pressure, as has been seen, was 80,000 pounds to the square inch. When the bolt was placed at 30 inches distance from the charge, all other conditions remaining the same, the pressure was only 6,253 pounds. Thus no danger whatever arises from leaving a single projectile in any part of the bore; but, on the contrary, the strain on the gun is greatly decreased by removing the projectile to some distance from the charge of powder."

That no undue importance was attached to the result of the experiment with the *Blakely gun* at *Charleston in* 1863 is shown by the successful application of the same principle in the experiments made with the 100-*ton gun in* 1876 *by Captain Noble.*

It is evident that if, in the case of the 38-ton gun on board the "Thunderer," the shell slipped forward in the bore, leaving a considerable space between it and the powder, the strain upon the gun, instead of being increased thereby, should have been diminished to a degree far within the limit of the strength of the gun. Therefore the explosion cannot be attributed to the existence of a space between the shell and the powder. It was probably due to the breaking of the

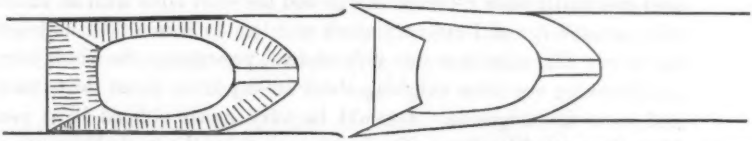

Diagram showing the wedging action of the fragments of an empty cast-iron shell in the bore of a gun when fracture occurs along planes of weakness in the shell.

shell and wedging of its fragments in the bore. It is well known that in metals passing from the liquid to the solid state, the molecular arrangement is such with respect to external cooling surfaces as to produce planes of weakness through all angular parts of the solid. Hence, in all cast cylinders terminated by a flat base, there is a surface of weakness,—the surface of an ideal cone the base of which coincides with the base of the cylinder, measurably determining lines of fracture. The degree of weakness varies with character of metal, rate of cooling, etc. Under the shock of discharge this cone tends to separate from the general mass, and this tendency is greater in the case of shells than in that of solid projectiles, for the inertia of the central mass opposing the relative advance of the cone in the solid is wanting in

the shell. This cone or frustrum, as the case may be, when driven forward enters the cavity of the shell as a wedge, expanding it in the bore. This wedging, combined with the direct pressure of the gas, is sufficient to rend the strongest gun.

In illustration, I may refer to an incident which occurred in 1864 near Richmond, Va. I was requested to permit a cast-iron cylindro-conoidal 6.4-inch shell, which had been cast upon an annular wrought-iron gas-check, to be fired from one of the 6.4-inch navy rifles, as an experiment. Regarding the shell referred to as peculiarly adapted to produce the effect described, I declined. It was, however, fired from a navy rifle which had been loaned to the army, and was then in position at Chaffin's Bluff. Lieutenant-Colonel J. M. Maury, commanding there, wrote, "I am sorry to tell you that your 6.4-inch rifle gave way yesterday in a most unaccountable manner, while testing some shells with a wrought-iron cup arrangement sent me by the Ordnance Department. The shell weighed 62 pounds; the charge used was 6 pounds, and the elevation $1\frac{1}{2}°$. At the first fire the gun broke nearly square off at the rear of the forward band, leaving that band entire. The other bands were broken in many pieces, and the part of the gun blown off was broken into three pieces of nearly equal weight, the fracture in each case being along the edge of the grooves. I was not present at the time, being down the river, but the firing was conducted by Major Taylor, who is a very careful and capable officer, and I am confident that the gun was properly loaded and fired, and I cannot account for the accident unless upon the supposition that the iron was affected by the frost. The charge used was small and the shell went freely home. The gun has been fired repeatedly with 8-pound charge and the solid bolts with no visible effect whatever, and I am very much at a loss to account for its bursting now. The explosion was very violent, prostrating the whole crew, and throwing one piece weighing about 1000 pounds about thirty yards and over the magazine. I would be very much obliged if at your leisure you would tell me if you can conjecture the probable cause of the explosion."

An Ordnance Board was convened by the Secretary of War to examine into the causes and circumstances of the bursting of the gun. After giving details of loading, etc., the board says, "The character of the gun, judging from the tabular statement heretofore given, taken in connection with the service rendered by two similar pieces at Charleston, which were cast under conditions as nearly identical with this as possible, from the same metal and like proportions, which guns have stood 1000 and 1700 discharges respectively, forbids the supposition that the gun burst because of faults inherent in it. The cause must be found elsewhere, and the board are of opinion, after an examination of the projectiles recovered (from former practice with this gun and subsequent practice with another), all of which are more or less broken (some hav-

ing the base entirely blown in or crushed, and others the ring torn off and lower edge of cylindrical part chipped obliquely upwards and outwards, while two were found which, having the bottoms destroyed, had been violently distended, the body of the shell itself taking the grooves), that the accident is due to the projectile used, the strain being intensified by the quick action of the comparatively small-grained powder."

Lieutenant-Colonel Maury, replying to some questions I had addressed to him referring to the recovered shells, wrote, "In one of them the bottom was driven in and the shell enlarged, showing the marks of the groove of the rifle on the cast-iron body of the shell."

The striking correspondence in the character of the explosions of the 38-ton gun and the 6.4-inch rifle, the similarity of conditions, reduced charges and empty shells, with results to have been anticipated from the theoretical considerations, lead to the conclusion that *the breaking and wedging of the shell in the bore* of the 38-ton gun caused its explosion.

It may be remarked in this connection that the breaking of an *empty shell* in the bore is more apt than the breaking of a loaded shell to produce explosion of the gun. For in the latter case the charge of the shell, igniting at the instant of disruption, tends to separate the fragments, opposing the advance of the wedge-shaped base and projecting other parts forward. It is obvious that the objectionable *flat-base* form in which shells are now cast should be altered to one that would not give rise to planes or surfaces of weakness, and that the sabot or gas-check should be of such form and so applied as to strengthen the shell.

The London *Times* of March 18 contains the following:

In the House of Lords, March 17, 1879, "the Duke of Somerset brought under the notice of their lordships the report of the committee appointed to inquire into the cause of the bursting of one of the 38-ton guns in the turret of H. M. S. 'Thunderer.'

"Lord Elphinstone explained the construction of the turret, the action of the hydraulic apparatus, and the manner of firing the gun, and announced that the Admiralty adopted the report and accepted the verdict of the committee."

After making complimentary reference to Captain Chatfield and all on board, he said, "A court of inquiry was ordered, composed of the senior officers present, and they came to the conclusion that the gun had burst owing to the projectile having slipped forward in the bore, leaving an air-space between it and the cartridge. On the arrival of the ship at Malta a second court of inquiry was held, consisting of three naval officers and three officers of Royal Artillery. Their report was before their lordships, together with the minutes of their proceedings, which appeared to be most exhaustive. They tried a series of experiments in order to ascertain whether the charge slipped forward on the withdrawal of the rammer, and although the projectile slipped if not secured by a

wad, the cartridge never moved. But as a matter of fact a wad was invariably used, and on trial it was found that it required a very considerable amount of force to move it after being rammed home. It was evident that, like the committee, they must look for some other cause than that suggested by the former committee in order to account for the bursting of the gun. The evidence was, he was bound to say, conflicting; for instance, the captain and two others saw three shots leave the ship when the electric broadside was fired, which, if that were the case, would clearly prove that three guns had gone off; the fourth charge, as he mentioned, remained in one of the 35-ton guns of the after-turret, owing to that gun having missed fire. But, on the other hand, four men stationed aloft, one of them a signal-man, whose special duty was to watch the firing, maintained that only two shots left the ship. Now the third shot was safe in the 35-ton gun of the after-turret. Two only left the ship. What, therefore, became of the fourth shot unless it was left in the gun, owing to a miss-fire? The committee relied, however, greatly upon the evidence of the gun itself. That silent witness could not make a mistake. In the first place, the recoil when the gun exploded smashed the buffers in the rear. With one charge that could not have occurred, for, as he had already mentioned, the recoil had always to be supplemented by hydraulic power, in order to bring the gun sufficiently far in for loading. Then there were marks upon the broken portions of the gun that showed most clearly that a projectile passed down the bore in the rear of the charge that burst the gun. Part of a stud that had belonged to the shell first rammed home was also picked up; added to which, Captain Noble, who was examined at great length, and whose evidence was well worth reading, maintained that an air-space, even if it existed at all, would not have caused the bursting of the gun. The committee, therefore, came to the conclusion that the explosion was caused not by an air-space, but owing to the gun having been loaded with two charges, and that opinion was unanimous." He further said, "There were, he knew, some men whose opinions carried great weight—men capable of weighing evidence—who refused to accept that decision. An opportunity would soon be afforded them of putting these opinions to a practical test, for it was the intention of the Admiralty to act on the recommendation with which the committee concluded their report, and to have the remaining 38-ton gun sent home. It would then be submitted to a series of test-trials, which could not fail to be of the greatest value."

The inferences to be drawn from the evidence herein quoted are not such as to materially strengthen the report of the committee. The fact that "four men aloft, including one signal-man, whose special duty it was to watch the firing," did not see three shots leave the ship can hardly be considered proof that "the captain and two others" did not see them. And while in the case of a double charge the recoil would

be more violent than with a single charge under ordinary circumstances, it is to be observed that in the case of a shell wedged in the bore, the recoil with but a single charge of powder should be more violent than with a double charge and free projectile, in consequence of the reaction from the forward part of the gun, measurably projected from the remaining portion, amply sufficient, indeed, to "smash the buffers in the rear," as well as to cause *transverse fracture* of the gun by longitudinal tension.

The fact that marks were found upon the broken portions of the gun, "that showed most clearly that a projectile passed down the bore," is not incompatible with the hypothesis of a double charge, indicating that the shell was home; but it assumes importance when we consider that such marking should in most cases attend explosion caused by the bareking and wedging of shells in the bore, as illustrated in the 6.4-inch rifle which burst at Chaffin's Bluff, and to which reference has already been made.

The proposed experiments with the remaining 38-ton gun will be looked for with great interest. The effect of air-space has been already so well determined that very little additional information can be anticipated with respect to that. Nor would experiments with double charges be of much value except in determining the characteristic fracture of explosions so produced. Experiments to determine the effects of the breaking, wedging, etc., of projectiles, empty shells especially, in the bores of guns would be most important.

Satisfactory results could be obtained by the employment of projectiles composed of separate pieces of such characteristic forms as result from fracture along known planes of weakness, the most important of which forms is probably that of a right cone or frustrum fitting in the base of a shell, its base forming the base of the shell.

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THE QUESTION OF NON-COMMISSIONED OFFICERS.[1]

BY A RETIRED OFFICER OF THE FRENCH ARMY.

(Translated from the *Revue des Deux Mondes* by First Lieutenant A. W. Greely, Fifth Cavalry, Acting Signal Officer.)

THOSE who understand the *rôle* of *cadres* in the constitution of armies have always appreciated the great importance of the question of non-commissioned officers and the difficulties associated therewith in all the military states of Europe.

France believed it had solved the problem in the grant to non-commissioned officers of the very important pecuniary advantages which the law of July 10, 1874, established. It grants quite high pay to the re-enlisted, and assures them, at thirty-five years, the privilege of a proportional retiring pension, eventually augmented by the salary of one of the civil positions (law of July 24, 1873) which are reserved for them in the different branches of the public service. But the effects of this law do not seem to correspond to the hopes it gave birth to, and new systems, which are strongly controverted, have been introduced, complicating the subject to such an extent as to render its study difficult for those who are unfamiliar with its special details. I shall endeavor to simplify it for everybody, freeing it from most of these details, in a short sketch of the principal features, which will clearly show, first, the end sought for; second, the proper means of attaining it.

I.

But one thing is sought, consequently easily defined. It is to retain in service, by voluntary enlistment, part of the non-commissioned officers whom the periodical discharges take away from it. But this definition, if simple, reveals a difficulty not at all so. How to complement the recruiting law, all whose limitations are rigorously obligatory, by provisions regulating and instituting among the habits of non-commissioned officers re-enlistment which springs from an agreement essentially voluntary?

[1] Corporals are not considered as non-commissioned officers, but as *hommes de troupes*.—TRANSLATOR.

I believe there are two methods, only two, and that their employment should be combined; they consist in an *ensemble* of means which shall attach non-commissioned officers to their calling: 1st *by interest*, coupled with the condition that this interest receives a satisfaction immediate, effective, tangible, in short, independent of increased pay and all other advantages (proportional retiring pension included) which are now offered by law to the re-enlisted; 2d *by the peculiar consideration and prestige* with which the profession of non-commissioned officers should be invested before the army, before the world, and, consequently, in the eyes of those interested.

Before elaborating these propositions I feel that I must explain the reason of the classification I have made, or, if you will, the reason of the order in importance in which I introduce them. It seems extraordinary indeed that from the stand-point of principles of military morale, of patriotism, of the spirit of self-sacrifice, I should not have given the highest place to honor, the second to interest. It is because there is here involved a vital question for the army, which no propagandism, viewed in the sentiment of military devotion alone, has been able to solve, because the opposing propagandism, waged incessantly by commerce, industry, and all the free lucrative careers, has annulled its effects. We must, as I have said, resort to both methods conjoined, commencing practically with that which responds best to the need of the times, which also most directly and efficaciously combats the allurements by which civil professions take away our non-commissioned officers from the army. Nearly all, at the time the law discharges them, have pecuniary needs, liabilities, embarrassments, which are illustrative of the small pay, the insufficiency of aid to the family, the temptations to which almost invariably succumb young non-commissioned officers, who are all now—in war we reap the advantages of it, and we should overlook its inconveniences in peace—in the passionate age which disquiets the commencement of all careers.

It is evident that, to put in practice the first method,—the one addressing itself to self-interest,—I unhesitatingly counsel the adoption of the principle of re-enlistment bounty. Wherefore has not the law of July 10, 1874, enacted for the amelioration of the condition of non-commissioned officers, with the object of encouraging re-enlistment, and which shrunk from no pecuniary sacrifice, attained its end?

It is because the advantages of high salaries increased at regular intervals, and of the proportional retiring pension itself, supplemented by the grant of a civil position, however considerable they may be, satisfy only future needs. These future wants were perhaps in former times the main source of anxieties and calculations of the old non-commissioned officers, very numerous in the army. They preoccupy but to a slight degree the young men aged from twenty-two to twenty-five, for whom the present is nearly everything, in whom the thought

of momentary needs predominates. I consider it certain that in their eyes no *future* advantage can be equal to that which offers them the payment, *at the time itself of re-enlistment*, of a capital whose free disposition will be insured them. Nevertheless, as the attraction to which they yield in this case will be rather the result of their improvidence and inexperience than of a studied calculation of their interests, it is necessary that the wisdom of the state and its solicitude for them should supply it: 1st, by continuing the liberal graduated salaries with a proportionate retiring pension, under conditions fixed by law; 2d, by subordinating the payment of the re-enlistment bounty to rules which shall guarantee on one side to the re-enlisted immediate enjoyment of a first installment, and on the other side shall protect their future interests by the placing in government bonds of a second reserved installment.

This is the principle. I do not here elaborate all the practical details. I confine myself to expressing the opinion:

That re-enlistments should be made for three years at the least,—not for two years, the too low minimum fixed by the law of July 27, 1872,—for five years at the most:

That the rate of re-enlistment bounty should be raised to 800 francs per year, say 2400 francs for three years, 4000 francs for five years, coupled with the condition of immediate payment to the soldier of a third of the sum fixed by the contract, say 800 francs for three years, 1300 francs for five years, the balance placed in government bonds, the certificates of which would be delivered to them when discharged;

That finally the revenues designed for bounties should be consolidated into a fund, called the *re-enlistment fund*, which should be maintained: 1st, by the payments demanded from volunteers of one year, which are in excess of the cost of their support in their corps; 2d, by a trifling and final (*une fois payée*) tax, which should be levied, under regulations which the legislative powers should determine, upon the different classes of exempts and of those freed from active service whom the law exonerates, in time of peace, from all the burdens of forced service. Sound reasons of distributive justice and signal reasons of public interest justify this proposition, and I need not, I think, dwell on it. It would produce annually by itself, even making an exaggerated allowance for uncollectable taxes, a considerable sum; 3d, by voluntary gifts, which would associate the spontaneous patriotism of citizens with the efforts which the country is making for the constitution of its military forces, that is to say, for the work of common safety.

Finally, this *ensemble* of advantages should be complemented, as has been said, by liberal graduated salaries and by the grant after fifteen years' service, five to be in the grade of non-commissioned officer, eventually supplemented by the salary from a civil position.

To the provisions of the law which I have just enumerated it would be proper to add this, that non-commissioned officers discharged with a

good character from the active army should, within the first two years of their enrollment in the reserve, be permitted to return to active service on the conditions above specified for the re-enlisted. If, re-admitted, they give excellent proofs of aptitude, zeal, and good conduct, they should be exceptionally authorized to complete the fifteen years' active service required to obtain a retiring pension, thus obtaining it at the maximum age of thirty-seven.

To these views I know that the theorists, who view the constitution of armies through speculations as to principles, tinctured with sentiment, will not fail to oppose the moral and patriotic authority of Article II. of the recruiting law, which is thus worded: "*There is in the French army no money bounty, nor any enlistment bounty whatever.*" I shall answer, that in their zeal for principles they confound two of them which are entirely distinct. The first, that which the above-quoted article establishes, is applied expressly and exclusively to soldiers, that is to say, to young Frenchmen who enter the army by virtue of the fundamental obligation imposed by Article I. of the same law: "*Every Frenchman owes personal military service.*" But, when this paramount obligation has been fulfilled,—this is the case of all discharged non-commissioned officers,—and it is of national interest to assure to the army the continuance of their services now voluntary, the second principle appears, and it is of the same order as that which directs the formation and maintenance of the superior *cadres*, of officers retained in service by an *ensemble* of advantages which correspond to proportional sacrifices agreed to by the country, and an *ensemble* of rights established by law or conceded by the state. It is this remunerating principle, which excludes in no degree that of patriotic duty, that there is a question of applying to young non-commissioned officers re-enlisted from armies constituted by obligatory service, so different in their origin, age, and aspirations from the old non-commissioned officers re-enlisted from armies formed by substitution.

The Italian army, whose thoroughly elaborated organization is so remarkably advanced, and which will be—I believe I can prophesy it—troublesome to the adversaries it shall meet in coming wars, has resolved the problem of the constitution of its lower *cadres*. It has solved it by the principle which I can prove well considered and by means resembling those I here propose.[2] The scaled enlistment bounty (with the privilege of annuities), the liberal salaries, the proportional pension after fifteen years' service (represented by government annuities), especially the certain retiring pension after twenty-five

[2] In the Italian army no one can be promoted non-commissioned officer without having previously enlisted for eight years; an excellent regulation, but which French customs will adopt with difficulty now. The greater part of the non-commissioned officers come from the corps of instruction (school of non-commissioned officers for all arms), recruited from the enlisted and drafted, who must, at the time of their entry, enlist for eight years.

years' service, such are the bases of the system considered from the stand-point I assumed in this first part of the discussion in order to assure to *those interested* the gratifications recognized as necessary. I cannot believe that the public opinion of France and its deliberative assemblies would refuse to accept it. How could the Senators and Deputies, whose services so long unrequited are now so liberally remunerated, reject, while invoking patriotic disinterestedness, the principle of re-enlistment bounty? What is more legitimate than to encourage and aid the non-commissioned officers, bound to the country's service by a contract the greatest risks of which—I mean the risks of possible war —are theirs? When we consider this contingency, does not the merit of disinterestedness remain entirely theirs?

On collateral grounds, I ask the abrogation of the limiting clause introduced in the law of July 10, 1874 (Article III.), thus worded: "Non-commissioned officers at the age of thirty-five years are entitled to a proportional pension. It can be increased *to the extent of twelve hundred francs*, including the salary relating to the position they may obtain by virtue of the provisions of the law of July 24, 1873." (Law on the granting of civil positions.) The legislator in admitting this limitation could not have been worse inspired. It is doubtless explicable from the stand-point of conservation of the financial interests of the country which it protects, though only to a slight degree. It is inexplicable as regards re-enlistment interests, which above all the law was interested in subserving. It destroys the special economy of this law; it injures its effects in the eyes of non-commissioned officers. They regard it as a strictly fiscal arrangement, whose object is to avoid existing agreements, at least to reduce the cost of them for the state, which seems to withdraw with one hand a part of that which it has given with the other, when, by chance, the salary of a civil position has acquired some importance.

A narrow view and a great error.

II.

It remains for me to discuss the second method, which consists, I have said, in a series of special measures calculated to elevate the status of non-commissioned officers before the army, before the world, and in their own eyes. The whole theory which I am about to set forth is experimental, that is to say, it is derived from practical observations made upon the spot, and which I sum up thus: "The inclination which an agent of power, clothed with a certain portion of delegated authority, whatever it may be, has for his office is directly proportioned to the consideration which it procures for him, 1st, from his chiefs; 2d, from his subordinates; 3d, from the public, which has, or which he supposes to have,—which is the same thing,—their eyes upon him."

I have verified the accuracy of this observation, which merits, I think, a place among the maxims of government, everywhere and in all situations where the management of affairs demands the employment of an hierarchal *personnel*. The Algerian Arabs themselves, whose social condition is so different from ours, showed us at the commencement of the conquest that they had this feeling to a most excessive degree. The first request that was addressed to or the first condition that was imposed on us by those whom we had invested with the red bornouse was, "*Atini horma*" (give me public standing); that is to say, show by public acts that thou hast taken me into consideration.

What is to-day, with some recent but scarcely noticeable modifications, the standing of non-commissioned officers in the army? It is traditionally quite obliterated in the infantry, a little more elevated in the cavalry, exalted yet a little more in the special arms of artillery and engineers, very ordinary and too inferior in all as regards its import as to guarantees of professional knowledge, of morality, and of authority such as the performance of their respective duties demands. It must not be lost sight of that the mission of non-commissioned officers in peace and war is to-day much more difficult and important than of old. In peace, because they have the setting up of the younger soldiers, belonging to all classes of society, following each other under the flag with a rapidity—it will be augmented in the future[3]—which leaves neither quiet nor truce to their educators. In war, because the condensed and relatively immobile lines of battle, which the *cadre* of officers and non-commissioned officers formerly directed efficaciously, are replaced, as regards infantry especially, by the broken lines, continuously mobile, too frequently disordered, of straggling modern warfare, where the non-commissioned officers mixed with the sharpshooters have an individual, even isolated, *rôle* of encouragement and guidance which is of vital importance, and which I shall have occasion to define with more exactness.

To elevate the character and habits of non-commissioned officers to the height of this double *rôle*, it is necessary that their officers, whose zeal should be unremittingly applied to imbuing them with it, should show for them on every occasion, especially and expressly before the troops, a consideration marked by much confidence in the details of service, by much regard and even courtesy in their daily relations. It is by the application of these methods of commanding that the marine officers maintain the rigid and traditional authority of the boatswain (*maistrance*) over the crews of the ships. This essential principle, now abandoned, was a regulation rigorously followed in the army of the old régime, where the officers, all of noble stock, never addressed an under-officer (*bas officier*)—the non-commissioned officer of to-day—

[3] When the length of service, as is necessary and inevitable, shall be reduced from five to three years.

without calling him "Mr." To the officers of the modern army, sprung in so great a number from the common people, this rule would seem to-day very unmilitary, as they say, and very unseemly. It would have, with all due deference to them, a deep signification; it would accustom the officer to consideration, the soldier to the respect of the under-officer, and the under-officer himself to a consciousness of the dignity of his position. Our non-commissioned officers have not inherited in this connection the good fortune of the under-officers. They are generally treated by their superiors with an indifference from which should be expected and which produces effects opposite to those which I have just portrayed. It occurs that they are loudly summoned, sometimes reprimanded, sometimes even punished before the troop. And I have made this singular observation, that officers sprung from the ranks are more accustomed to unceremoniousness with regard to non-commissioned officers, whose chevrons however they have themselves worn of old, than officers emerging from military schools, who enter the army as a matter of course with the epaulette.

Who would believe that our rules and methods of disciplinary repression, unchanged for three-quarters of a century, and which demand to-day such radical reforms of principle and practice, are applicable and applied to non-commissioned officers exactly as to the soldiers in our regiments? The shortcomings of both are visited with the same class of punishments, and it is not rare that the guard-house door is closed on non-commissioned officers,—the guard-house of which I could show the traditional and unfortunate misuse, as well as its deteriorating effects upon the character and morality of the soldiers themselves. For the non-commissioned officers who command, and for the military throng which is commanded by them, should there not be different methods and degrees of disciplinary repression? Why, for example, would not the first be sensitive to reprimand before the non-commissioned officers of their company, of their battalion, or of the whole regiment? Why would not this graduated repression act more certainly, more honorably upon their spirits than this imprisonment, where for faults frequently venial they are brutalized in darkness and idleness? If to this question the admirers of our old regulations of internal service answer negatively, wherefore, I shall say to them, is or remains a man thus treated a non-commissioned officer, that is to say, associated with command and exercising it in a measure with all the responsibilities which appertain to it? Do you not see that if, in the present condition of our customs and regulations created for other times, the non-commissioned officer of the French army, by reason of his character or education, has a tendency to escape from the subordinate condition which they make for him, you will almost unfailingly bring him back to it by the methods which you should apply to him?

I believe that in order to institute some of the principles which I have hitherto sketched, a *law on the rank* (*l'état*) *of non-commissioned officers* is to-day as necessary as was formerly the *law on the rank* (*l'état*) *of officers*, which in the constitution of superior cadres, previously troubled by arbitrariness, indicated such marked progress; but to believe in the analogy of the two principles, of the two situations, and to seek its establishment by law, would be to fall into a serious, perhaps dangerous, error. Indeed, the law upon the rank of officers has as an object the fixing regulations for *a career which is definite*, and of legislating on the rights of a *personnel* which it considers devoted to the country's service until intellectual decay and physical invalidity approach; the law on the rank of non-commissioned officers deals, on the contrary, with a *career which is only provisionary*, and treats of the rights of a *personnel* which the service of the country retains only for a very limited time. It gives to non-commissioned officers in the prime of life the liberty of following a new profession, and by a generous exception grants them at this age the benefit of a life-pension which officers obtain only at the threshold of old age. Finally, it conditionally obligates itself to find for them this new profession and to open the door thereto.

From this marked difference in the obligations and deserts springs a correlative difference in rights and guarantee of rights. Equity ordains it; *discipline ordains it also;* and I express here a sentiment based on experience, persuaded consequently that non-commissioned officers, as regards the head of the corps, should be held in closer dependence than officers. A law on the rank of non-commissioned officers which should fail to guarantee their moral and material interests as fully as the situation demands, but which should, on the contrary, task itself in creating new rights of rank, tendering, for example, some analogy to those laws which guarantee to officers the ownership of their grade, would fail doubly in its object.

On the one hand, non-commissioned officers do not care for these rights; for, serving a limited period, they do not feel the need of protection against an arbitrariness which they can always escape by quitting it, and which, besides, exists to no considerable extent in our regiments, where, on the contrary, there is no kind of inducement but is resorted to in order to retain them. Consequently, this grant of rights of rank would not be sufficient to excite their fervor for re-enlistment.

On the other hand, the ill-judged excess of these rights would not fail to exaggerate in many non-commissioned officers a feeling of their importance, to suggest pretensions to them, and consequently render them less tractable to their officers and to the head of the corps. Now, it is of the highest disciplinary importance to preserve for these officers over the careers of the *cadre* immediately in contact with the troops which

they command, consequently over this *cadre* itself, a *permanent, immediate, absolutely indisputable authority.*

I enumerate hereafter such guarantees of rank as, in my opinion, necessarily and sufficiently should environ the career of non-commissioned officers:

1st. A register of the *personnel* of non-commissioned officers similar to the register of officers, subject to the same control, should be kept in all corps of troops and in all military establishments. It should include, successively inscribed and in detail,—opposite each name,—all information calculated to set forth their merits and failings, together with their peculiar fitnesses. This register should be one of the principal sources of information to be consulted in making up lists for promotion and in selecting skilled candidates for civil position conditionally reserved for discharged non-commissioned officers.

2d. The different grades and places of the inferior *cadres* should be left in the gift of the heads of corps, who should deliver to the promoted a *warrant* (*un titre formant brevet*). And on this subject let me here remark, in the French army the very old, and to my mind very useful, institution of commissions—authoritative documents showing the bestowal of the grade—has disappeared. They were conferred on officers nominated or promoted, who receive to-day only a manuscript letter of appointment. The non-commissioned officers, besides their discharges, in all respects like that of soldiers, where are very curtly mentioned the holder's services, receive no special document of promotion which they can retain with glory to place in their family archives.

3d. Reduction should be made only upon the advice of a *conseil de discipline*, by the chief of the corps for the conscripted, by the general of the division for the re-enlisted.

Finally, I should expressly pray that reduction in rank should disappear from the list of disciplinary procedures applicable to non-commissioned officers. The principle is one of the errors of our old regulations. A non-commissioned officer half-broken serves only with disgust in the less important position to which he was publicly reduced, and in regard to his subordinates this reduction takes away from him too much moral authority for him to usefully exercise command.

Of these last propositions one only—that which institutes *conseils de discipline* to be assembled to take cognizance of serious faults which might entail loss of rank—would find place in a law on the rank of non-commissioned officers. The others are of an administrative order, and it is the place of the Minister of War to introduce them into practice in the army by the means of regulations. In my opinion the law on the rank of non-commissioned officers, recapitulating the intentions of the very desultory legislation which prevails to-day, should include: 1st. Those which relate to re-enlistment (right to re-enlistment bounties, to liberal graduated salaries, to the proportional retiring

pension,—law of July 10, 1874); 2d. Establishing of *conseils de discipline* to decide by means of preliminary advice upon all cases of grave demerit or of degradation (breaking); 3d. The regulating of the rights of discharged non-commissioned officers to civil employments. It is evident that the law on the grade of non-commissioned officers thus ordered would be at the same time clear and simple.

I consider now the condition of non-commissioned officers under the very important particular phase of methods to be used for establishing between them and the soldiers, in the differing circumstances of their common life, the lines of demarkation which time, indifference, and unrestraint have nearly effaced.

Lodging.—All the non-commissioned officers—the adjutants alone to-day enjoy this privilege—should have to themselves[4] a little room plainly furnished, where each of them can find quiet by night and day, with the free disposition of their hours of military leisure for personal work.

Table-service and assembly-room.—It is indispensable that the non-commissioned officers should have an organized table-service better ordered with regard to comfort, cleanliness, and attendance than that which prevails to-day in the regimental canteens; indispensable, also, that they should have a place of meeting suitably furnished, warmed during winter, lighted, provided with professional books and journals.[5] If this last suggestion was properly regulated and looked after, its results would be very important. In the composition of the corps of non-commissioned officers to-day enter young men who are not without some education, and others are of the age when acquired habits are susceptible of modification by association and example. These reunions engender among them the spirit of sociability, of good-fellowship, with a certain degree of culture in those who apply themselves to the study of the publications placed at their disposal. Some lectures opportunely given by capable officers on professional duties, on war, on new discoveries, on military events which are occurring abroad, would not fail to engage their attention and excite their interest. By this *ensemble* of means we would succeed in making of the non-commissioned officers of a regiment, who to-day live in isolation, forlornness, idleness, and subalternation, a respectable and respected class, whose members would be united in bonds of solidarity and would feel the importance of their commission in the military establishment.

Uniform and equipment.—The non-commissioned officers of mounted troops very nearly occupy in this respect the situation suitable for them. It is otherwise with foot-troops. I do not ask for them any additional ornaments which are traditional distinctive marks of their rank in the hierarchy, thinking that "befeathered troops" (*armées à*

[4] This plan has been introduced in the Italian army.

[5] These arrangements have been introduced into the Italian army.

plumets), that is, those who deviate from simplicity, wander at the same time from modern military reality. But I attach much more importance to the point that their uniform, as a whole, should be more clearly distinguishable from that of the soldier. All, for example, should wear the half-boot, and for all the frock-coat should be of the same dark-blue color as that of the officer.

Their armament should undergo most thorough modifications, and I enter on this subject with some necessary explanations. In times past, in army matters, *éclat* too frequently prevailed over the sense of utility. Hence it was that for officers of infantry a light cavalry sabre, fixed to the sword-belt by a hook, hanging loose, noisy, inconvenient to the greatest degree in rapid movements, was substituted for the true infantry arm, the sword with leather scabbard falling flatwise and fixed upon the thigh by the cross-belt. For the soldier, the short and light bayonet, quite sufficient for the infantryman for the offensive and on the defensive in a conflict, silent in its sheath when in war the infantry attempt a night surprise, was replaced by the monstrous apparatus which they call the bayonet-sabre,[6] with massive metal sheath. It harasses with its weight the already overladen soldier, retards his rapid gait, and its metallic tinkling, announcing to the enemy from afar the movement of troops on the march, renders surprises impossible. Finally, it transforms the gun, the missile weapon *par excellence*, the arm of combat at a distance, into a weapon of the hand formidable especially in a hand-to-hand struggle in that combat of the bayonet which French tradition has rendered famous, but which is nevertheless so rare that officers grown gray in the service have never seen it.

This short technical digression upon infantry accoutrements has no other end than to completely justify the wish I here put forth: that the sword shall be given to officers of foot-troops. *All non-commissioned officers should wear it;* and the presence of the sword will be the line of special and characteristic demarkation which shall separate in future their *rôle* in the army from the *rôle* of men of troops (*corporals* and soldiers).[7] I insist particularly on this proposition, which is not alone important from the personal stand-point previously taken by me. It is in another connection, which has not been, to my knowledge, yet studied, and which merits to be; that for exercises of peace, those which have as an end the instruction with which non-commissioned officers are charged, and the manœuvres where they have the duties of guides determining alignments, the non-commissioned officers of foot-troops should carry *exceptionally* the gun, is most natural and necessary.

[6] It has just been replaced in its turn by a bayonet much lighter and more manageable, for which, unfortunately, they have retained the metallic sheath.

[7] The non-commissioned officers of the engineer arm, so worthily faithful to excellent military traditions, have preserved it. If we should take away from them the sword, we could no longer find non-commissioned officers for this select corps.

But that in war, in modern scattered combat, where they have to-day, in the midst of sharpshooters, a primary *rôle* of direction and encouragement, they should have the *impedimenta* of a gun and should sharpshoot themselves, is a military misconception which is only one of many that time and experience will reveal in the new organization of the army. The non-commissioned officers command there, in a formidable crisis, under a fire the sharpest, the closest, the most deafening, a little group of men who fight within reach of their eyes and voices. By incessant efforts of activity they go from one to another, directing their fire, showing them shelter (trunks of trees, holes, hillocks, etc.), where they can find the relative security to which they owe the faculty of reflection which permits them to aim.[8] In a word,—a soldier's word,—they put in ambush their men, and when the time comes to march forward, or to the right or to the left, it is necessary to draw out the sharpshooters from these shelters,—an undertaking which is not as simple as one thinks, and which demands on the part of the *cadre* a redoubled energy.

This is a roughly-drawn sketch of the combat of to-day. And the men who are commissioned to direct should enter personally into action! They should put themselves in ambush also, load their arms, fire, abandoning finally the work of commanding for the work of fighting! I believe I have demonstrated that non-commissioned officers in war should, no more than officers, be armed with a gun. The sword and revolver are, in any event, what they should be provided with in the shape of defensive weapons.

In considering as a whole the propositions I have advanced to solve the question of non-commissioned officers, it is seen I have first regarded it from the stand-point of common sense and practical experience where stands the German military writer, who says with as much exactness as uncouthness, "Do you wish good *cadres?* Put your hand in your pocket." But I have not confined myself to recommending this method, which serves efficaciously all institutions at all times and in all countries. I have strongly recommended a complementary method, which I believe particularly potent in France, and I have said, *Do you wish good cadres? Elevate them to the importance of an institution. Know how to interest public opinion therein and to associate public effort therewith. Especially make your non-commissioned officers of more importance in the eyes of the country, the army, and themselves.*

[8] Under the murderous fire of the first lines, the sharpshooters with the whole of their bodies exposed are agitated by emotions which rarely permit them to aim. They fire before them, with random shots, some so precipitately that they do not take time to put to their shoulders the new arm, which has little recoil.

NAVAL EDUCATION AND ORGANIZATION.

SINCE the year 1845 it has been considered of sufficient importance for the government to give officers of our navy an education that would fit them to perform with intelligence and ability the varied duties which devolve upon them.

Their early training is also intended to imbue them with proper ideas of discipline, which can alone enable an officer to cope with the stern realities of a naval life when fairly embarked upon the ocean.

But while the government has been extremely liberal in affording a proper *nautical education* to its officers, some persons have expressed doubts whether the course of study at the Naval Academy is such as to fit the cadets for those higher positions which are open to every civilian possessed of a good English education.

It would seem hardly just to give officers of the navy simply a professional education, implying thereby that they were only wanted to perform nautical duties; that they were merely "food for powder"; men brought up to handle guns, trim yards, and be blown up or shot when occasion offers.

Officers of the navy have really a higher mission to perform in time of peace than in war; in the latter it is plain sailing, and an officer who is master of his profession and possesses good judgment will always maintain the honor of the flag.

In time of peace a commanding officer has often intricate and delicate duties to perform. On foreign stations he comes in contact with the ablest naval and military commanders of the different powers, and, in order to properly represent the United States and reflect credit upon our vaunted system of education, he must take a prominent position among them.

Our commanding officers will be presented at the different courts of the world and represent their country at the South American republics, where we have not only large commercial interests, but a bond of sympathy, which always unites people of the same political creed.

Wherever he may go, a naval officer in command is called upon to accept, in behalf of his country, courtesies from the highest civil and military authorities, and he is constantly liable to be placed in positions where the highest faculties of his mind are called into play.

He may become involved in international complications of the greatest gravity, where it becomes a question of peace or war, and where everything will depend on his knowledge of international law and his ability to meet the various arguments brought to bear upon the subject at issue.

It follows, then, that a naval officer should be well read in the laws of nations, be familiar with principles and precedents, and ready to support by proper argument the view of the case which he wishes to establish.

He may sometimes have to draw up a treaty with a foreign power. Decatur and Biddle were both placed in this position, and both performed their diplomatic duties with credit to themselves and to the entire satisfaction of their government, yet neither of these officers had the advantages of a naval academy, but received their education in the rough school of necessity, where they made themselves acquainted with all subjects bearing upon international relations, and, though the men of to-day may look upon them as rough old seamen, they were really educated gentlemen, with manners fitting them for the highest courts of Europe.

They and their contemporaries could navigate and fight their ships with a dexterity which has never been surpassed, and in the decline of life, when the fire of youth had burned out, they proved themselves able administrators of the different departments of the navy, at that time mostly of a civic character.

When young men enter the navy they are governed by two leading motives: one is to obtain a livelihood in a pleasant profession; the other to obtain glory and promotion. They think little of the important duties they will have to perform in time of peace, exploring the deep and making plain for the information of the world the physical geography of sea and land, in protecting our missionaries from the savages among whom they are domiciled, and many other duties too numerous to mention.

In the end glory and naval fame will not be oftenest found in times of war; for peace furnishes at least equal opportunities for distinction. As Milton in his Sonnet to Cromwell expresses it, "Peace hath her victories, no less renowned than war."

The acquisition of military glory, without doubt, requires courage, which, by the ancient philosophers, was deemed one of the cardinal virtues, and by Aristotle was given precedence over all others. Yet military glory is a plant which can flourish luxuriantly only in fields of blood, when its roots are bedewed with the tears of suffering humanity.

There was a time, not many years ago, when peace was a distant vision, and war so far in the ascendant that the highest distinction a man could have was to be a butcher of his fellow-creatures; but those

days have passed, and the wide extension of knowledge, and the consequent enlightenment of the human mind, have so changed the feelings of mankind that probably war will henceforth be the exception among Christian nations.

Perhaps in a century from now men will turn away in disgust from the record of slaughter in what they will consider the benighted ages, to something more pleasing and more promotive of happiness to the human race.

The works of peace are more lasting than military fame, for the recollection of warlike deeds perishes in the lapse of time. Some names are remembered by the student of history as famous conquerors, while hundreds of those who have added to the sum of human knowledge are familiar to us all as household words.

Even the narrative of Leonidas in the Pass of Thermopylæ may in the course of ages come to be looked upon as a fable, if remembered at all, while the Iliad, which is, perhaps, but a fiction, will be read, as now, in the centuries to come.

Glory in a military man depends upon the use he makes of his successes. If in the hour of victory he acts in obedience to the higher sentiments, with mercy and justice as his guides, he may compass an enduring fame; but should he deviate in the least from this line of duty, the chances are that his fame will be like that of the Scandinavian Vikings, who are classed as pirates rather than as heroes.

Compare the works of Newton with those of Napoleon. The former will continue to benefit the world, and be remembered as a benefactor, while the sentiment of mankind is liable to undergo a great change in regard to the fame of the latter. To those who have contributed the most for the welfare of their species will be awarded the palm of excellence.

The philosophy of Bacon, which has advanced the world two hundred years, will endure forever, and the discoveries of Columbus will be considered more famous than the greatest battles ever fought, because he led the way to a continent of boundless wealth, where all the oppressed of the world (Chinamen excepted) can find a refuge.

The glory of war is evanescent, and a young man who enters the navy with the idea that he will overtake happiness in the shape of brave deeds in battle will find himself wofully disappointed.

War is the last expedient resorted to when all others have failed, and it is a calamity every thinking officer must deplore, although he will make up his mind to sacrifice life and all in the performance of his duty when the dread moment arrives.

Those familiar with Milton may recall the beautiful lines:

> "They err who count it glorious to subdue
> By conquest, far and wide to overrun
> Large countries and in fields great battles win," etc.

The chances for obtaining naval glory in war are small, for war service forms but a brief period in an officer's career. The United States has been an independent nation for more than a century, yet we have been engaged in but three wars of moment,—one of which had nearly put an end to our existence as a nation.

How much better, then, would it be for naval officers to cultivate the pursuits of science, literature, and art, which will prove to them an everlasting source of pleasure on shipboard, where a large portion of their cruise must be spent, since there will be plenty of time to attend to their nautical and military duties, which, when once learned, are not easily forgotten.

Notwithstanding the high estimation in which the Naval Academy is deservedly held, I do not think the system of education there pursued is calculated to expand the mind, or give such pleasure to the graduates in after-life as is afforded by an education at Cambridge or Oxford, Harvard or Yale.

It has a tendency to make a man a machine, confine his intellectual faculties within a certain sphere, and take from him that independence of thought, the inalienable right of every one, which need not interfere with the discharge of any duty, or cause one to violate any law.

My second proposition—that a young man enters the navy to obtain a livelihood and enjoy a fine profession—is a self-evident fact. He enters the service with the prospect of living twenty years in an apartment six feet by six! with an abundance of hard knocks and coarse fare; and at the end of his active service his constitution is most likely impaired by exposure and disease, with perhaps not the slightest prospect of the fame or glory he fondly anticipated at the outset of his career!

On the contrary, our aspirant may have passed many useless and lonely hours for want of those resources which a more liberal education would have given him.

In examining the list of studies at the Naval Academy, the most casual observer would be impressed with the amount of instruction a cadet must undergo ere, under the auspices of *alma mater*, he can step upon the quarter-deck as one of the *bona-fide* defenders of his country.

The mind of the graduate must be filled with guns, grape-shot, iron-clads, and torpedoes, and he probably never dreams that a naval officer has a higher mission than that of waging war against peaceful commerce upon the ocean, or harassing the unoffending inhabitants of an enemy's coast.

The mission of a naval officer should be to protect the citizens of all friendly nations and to help keep the peace in every part of the world.

Of this idea we have recently had a beautiful illustration in the case of a British naval officer, who, in the absence of any American vessel

of war, rendered our citizens in Alaska such substantial aid against the savages.

This commander comprehended the higher Christian duties devolving upon him, being imbued with that liberal philanthropy which is the natural outgrowth of an English education, and which is an enemy to contracted ideas, either in naval, military, or civil affairs.

But for the prompt and judicious action of the captain of the "Osprey," which deserves the highest mark of approbation from the British government and from our own, the greatest calamities might have befallen our citizens in those remote regions. It will no doubt be a subject of pride to the British nation to see its navy engaged in such acts of fraternal kindness. May our own navy strive to emulate them!

The following is a list of the studies pursued during the academic course of four years at Annapolis, and it might appear sufficiently copious to satisfy all the educational wants of the naval service,—perhaps it is.

Fourth class.—Arithmetic, algebra, English grammar, history of the United States, universal history, geography, drawing, rudiments of navigation and surveying.

Third class.—Algebra, geometry, trigonometry, French, Spanish, seamanship, history, drawing, gunnery, physical geography, surveying, navigation, natural sciences.

Second class.—Trigonometry, conic sections, analytical and descriptive geometry, French, Spanish, infantry and artillery tactics, navigation, surveying, gunnery, seamanship, line drawing, natural sciences, chemistry, steam-enginery.

First class.—Calculus, international law, French, navigation, surveying, seamanship, gunnery, natural sciences, chemistry, steam enginery, naval architecture, telegraphing. General application of what has been learned during junior years.

No matter what may be thought of the distribution of these studies, perhaps the best that can be made under the circumstances, it is sufficiently evident to the practical observer that all these branches cannot be fully comprehended during the four years which cadets pass at the Naval Academy.

What they acquire at Annapolis can only be considered the groundwork of an education which is to fit our naval officers for those high duties they may be called upon to perform during the forty years, which is the limit of their term, of active service.

Whatever, then, may be the value of the education acquired at the Naval Academy, it is merely a preparatory course on which the graduate can build in the future the final work which is to mark him either as the highly intellectual member of his profession or the commonplace person, of whom we encounter such numbers in all the walks of life.

No one supposes that in the four years' course at the Naval Academy a cadet can acquire a thorough knowledge of the higher mathematics, or that he can do anything more than lay the groundwork of the natural sciences, chemistry, naval construction, and steam, since the average student enters the Naval Academy with but an "elementary English education," and very elementary at that.

If a cadet should graduate at the Academy with the idea that he has thoroughly mastered the studies of his course, and that no further preparation is necessary to fit him for the important positions in which he will be placed, he would labor under a great delusion. Let him think of the four years' course which a young man at Harvard or Yale must undergo after his three years of preparation at Exeter or other high school at the North, in all seven years of close study, before he can take his place in the ranks of accomplished students, and then his work has just begun. Or let our cadet reflect on the career of an English student, who, after four years preparatory study at Eton or Harrow, passes five or more years at Oxford or Cambridge before he can take the degrees preliminary to occupying the high official positions which are open to educated Englishmen.

A graduate of the Naval Academy who is satisfied with the unfinished education he receives at Annapolis, can never be a thoroughly educated officer. Much of what he was taught was distasteful to him, and he only learned enough to leave him without a desire to know more, and did not fully comprehend the principles of the sciences in his course. Such a person is like a traveler who has passed through an interesting country without troubling himself to examine it.

The difference between a thorough scholar and one who has received a smattering of an education may be illustrated in this way. The latter will look at a body of water as a place for sailing a boat or for catching fish, while the philosophical observer will think of the elements which compose the water, one of which is as combustible as gunpowder and produces death when inhaled singly, and the other supports combustion, the two united forming the means of extinguishing combustion, a seeming contradiction which shows how beautifully our Creator has adapted his works for the benefit of his creatures.

To one who is versed in the philosophy of nature the most delightful employments are offered, as well as a perpetual source of instruction and amusement, in the contemplation of those discoveries which are constantly being made by men of thought and research for the benefit of the world. A year's study of natural philosophy, as it was taught by Bacon, would be worth more to a naval officer, in the way of his enlightenment and amusement, than a long period of ill-directed application to a variety of subjects.

In natural philosophy is included almost all knowledge affecting the physical condition of the earth, air, and water, and the embryo

philosopher at every advance he makes in his studies is opening for himself a new world of information and delight, and his toilsome way is cheered, as the darkness by which his mind was obscured is gradually dissipated by the light of truth.

We should esteem ourselves fortunate in living in an age of so much intellectual activity, where the amount of knowledge possessed by the average student exceeds that of the philosophers of antiquity.

Owing to their want of knowledge of physics the boasted civilization of ancient Greece was still lacking in completeness, and in many respects her citizens were but barbarians compared with the Christian nations of to-day. Her poets, painters, and orators may have been all that is claimed for them, yet were the ancients deficient in that practical philosophical knowledge which in its utility as applicable to the common wants of life is beyond all price, and not to be compared with the teachings of Socrates, for instance, which tend to a false system of morality.

Modern philosophy is in every respect beneficent. There is a philosophy of life and the philosophy by which the wants of life can be supplied.

The philosophy of Bacon has done more for England than the efforts of her greatest statesmen. What it has done for England it will finally do for us, by developing the apparently illimitable resources of our country; for where it has given to England thousands of bushels of wheat it has given us millions. It has been the means in both countries in utilizing millions of tons of iron, copper, lead, and tin ore. It has enabled England to extend her commerce and become the benefactor of the world.

It would benefit us in the same way, only that nature has been so bountiful to the United States that we can live within ourselves, and do not value as we should a commercial navy to support our prosperity.

We do not, like England, study to encourage commerce, for on commerce depends her existence as a nation, almost controlling the destinies of the world.

To England then are we chiefly indebted for the knowledge of that natural philosophy which would make us even greater as a nation than we are already were we to study it more closely.

We flatter ourselves that we are entitled to an equal share in the fame of the great poets and philosophers of Great Britain by virtue of our Anglo-Saxon lineage, but such a faith without accompanying works is hardly better than the jackal's claim to the feast prepared by the lion. We are only students of those great discoveries which have been promulgated by the philosophers of the Old World.

It can hardly be expected that naval officers should be great philosophers, since few persons in any country are eminent in that direction; but they have abundant opportunities of collecting much useful infor-

mation relative to the physical geography and natural history of land and sea, and would be greatly stimulated and facilitated in their researches by an acquaintance with the works of the great authors, who stand on higher pedestals than the generals or admirals of history.

Take, for instance, such a fame as that of Newton. Think of the profound reasoning, far beyond that of the ancient philosophers, by which he demonstrated the position of the earth and its relation to the planets, and by his theory of gravitation accounting for their motion around each other and a common centre.

He not only weighs this world in his scales, but balances one world against another, noting the density, gravity, and attraction of each, so as to give them their relative positions in the heavens; and, finally, he balances systems of worlds against systems of worlds until he has unfolded the most harmonious scheme, one that has stood the severest criticism without impairing the truth of the theory. He measures the mountains and sounds the seas, and weighs them all, so that it may be said, figuratively, that he held the whole universe in the hollow of his hand.

Newton has done everything to make Christian people understand the source of all the blessings we receive.

There can hardly be a second Newton, since it is but seldom that such inspired men are permitted to live on earth, but there is no limit to the number of disciples who will help work out the details of his great discoveries.

Newton's works should be studied by every one who would fully understand the laws of nature.

Few persons have so good an opportunity of making contributions to science as naval officers, for the seas which they traverse contain innumerable objects of curiosity, with their history unknown or only partially developed, and there is an illimitable field of exploration awaiting the investigation of those who have the taste and industry to undertake the task.

The ocean is a vast nursery of Fauna and Flora, hardly less interesting in their way than the products of the land.

When we are borne smoothly along over the bosom of a summer sea, or are tossed about by mighty billows, we seldom think of the mysteries that lie buried in the depths of ocean, nor reflect that every cubic yard of salt water contains millions of marine animals which have been objects of study to the wisest philosophers and sources of pleasure to those who delight to investigate the wonderful economy of nature.

No great amount of labor need be attached to the pursuit of simply forming a collection of the various minor organisms which are found on and near the surface of the ocean. The apparatus required is simple, and the specimens could be packed in small cases and sent as opportunity

offered to scientific institutions, where they would be arranged and classed according to their species.

Such pursuits, if followed up, would soon become a great source of pleasure and instruction to officers, and would give them a practical knowledge of the physical geography of the sea, which it is very desirable they should possess.

All the inhabitants of the deep—even the minutest specimens—have their significance in the economy of nature, and, undeserving as they seem of notice to the superficial observer, are as legitimate subjects for discussion as are the leviathans of the ocean. Those beautiful coral formations which are built up from the bottom of the sea are the production of insects so tiny that they can only be investigated by the aid of the microscope. All the crustacea of the ocean perform no more important duties than these little workers which are links in the chain of creation.

It is safe to say that, owing to the introduction of mineral oils, the world might get along very well without the whale, the walrus, and other oil-producing animals; but the absence of these small matters would disturb the economy of nature, for they help establish and keep in adjustment some of the most beautiful compensations of which the mind can conceive.

Those marine plants which are so abundant in the depths of ocean are but the vegetable products of those impurities which animal life is continually casting into the sea, and are charged with the duty of absorbing the deleterious substances which are washed from the land, and cannot be held in solution without making the ocean uninhabitable for its natural denizens.

The marine plants purify the atmosphere of ocean, as the leaves of vegetables on land absorb the carbonic acid gas which otherwise would render the air we breathe unwholesome. To the minute inhabitant of the ocean is assigned the task of building into a solid substance the alkaline salts which are constantly increasing in the waters.

If such small objects occupy such important positions in the economy of nature, what may we not expect in those larger inhabitants of the deep, which must exercise a greater influence on the waters of the ocean? How little do we know of them and of their functions, and how desirable such knowledge must be!

Notwithstanding all that has been written regarding the natural history of the ocean, vast fields are still unexplored, and a knowledge of these will weld together the links which show the relative necessity of submarine animals and plants, and demonstrate the beneficent designs of Providence more conclusively than ever.

Many treatises have been written from time to time for the purpose of establishing the relations of marine animals with each other and with the water in which they live, as well as to establish the natural

system by which they are regulated; and since the works of nature have become objects of such special investigation by scientists, it has been the endeavor of naturalists to arrange all objects in natural order, so that the student would have as little difficulty as possible in laying out a method of study and collection, and becoming in a comparatively short time very expert in those matters.

The library of every ship in the navy should contain all that concerns the fundamental relations of marine animals and plants. The essays of Agassiz on classification, contained in his works on the natural history of the United States, are plain enough for the simplest understanding.

The career of this great naturalist is a proof of what industry and properly directed efforts will accomplish. He had not the personal facilities possessed by many naval officers, and his works were prepared amid the pressure of numerous official and other duties, sufficient in themselves, one might think, to absorb all his time.

Although few persons can possess the talents of an Agassiz, yet all may be his disciples, and by following the rules laid down by him we can add our contributions to those already made, and gain that knowledge so essential to the education of a naval officer.

The work of officers of the navy on the Coast Survey proves that no people are more apt in labors of this kind. Under direction of the intelligent and indefatigable superintendent of the Coast Survey, they have been employed in making marine collections from the remotest depths of ocean.

Many persons may wonder in their own minds, although they may not give expression to their thoughts, what good can come from these gropings in the ocean or from these multitudinous collections that crowd our museums and apparently differ so little from each other, or what importance can attach to the classification of animals so minute that they can only be examined by the aid of the microscope.

The explanation may be offered as follows: if it can be shown conclusively to free-thinkers that the plan of creation, which seems so perfect to the reflecting Christian, exists throughout the animal and vegetable kingdom, and is an intellectual idea in the mind of the great Author of all, and not the outgrowth of independent physical laws, then the world may finally be able to comprehend the whole system of compensation by which we are governed, and the idea of the unvarying action of physical forces binding all things to an inevitable destiny will be disproved.

Surely it is more pleasing to adopt the belief that every object, even the minutest, was matured in the mind of the Creator before it was manifested in any external form, and that nothing was the result of accident. All this is demonstrated by an examination into the relations which these minute organisms of ocean hold to each other, and if we

can do anything to discredit the false theories which are doing the world so much harm, our time at sea will be profitably spent.

The navy has seldom produced men of science, though there is no field where this kind of culture should so easily take root and flourish.

Officers of the navy are thrown in contact with scientific men in all parts of the world, and the highest institutions are open to their investigation.

Those in the navy who have made their mark in the higher branches of science, or hold eminent positions in civil life, are not those who graduated at the Naval Academy, but were trained at the colleges of the country before or after entering the service; and they have been recognized by their fellows as men worthy of their high reputation, which they have endeavored to extend under whatever circumstances they may have been placed.

In reflecting upon these facts I am induced to think that, in addition to what is already taught at the Naval Academy, an enlarged course should be instituted, for the benefit of the young men at a more advanced age. It should be considered part of the necessary education of every student at Annapolis.

The Academy possesses all the facilities for a more advanced course in instructors, instruments, and buildings, and with two years' additional study and application of the higher branches of mathematics, natural sciences, natural history, languages, and literature, our officers would have a prospect of becoming familiar with that which at present they can but imperfectly comprehend.

A cadet now leaves the Academy at the expiration of four years, and is supposed to spend two years at sea, putting in practice the theories he has learned at Annapolis. After his final graduation, which makes him an ensign, he should enter upon the advanced studies, which are either to mark him as a scholar or the mediocre man in point of general information.

There are many who have involuntarily to submit to being classed in the latter category, from the fact that they have never had the opportunity to perfect themselves in the higher branches of knowledge, and most officers would hail with delight the addition of this higher range of studies after a two years' cruise at sea.

It may be objected that by making the naval officers scholars they would cease to be seamen: but this is not a valid objection, for, notwithstanding the complaints that are made in this respect, my observation satisfies me that there are as good seamen among our naval officers as ever there were, and there is a much better *average* in all the grades. In short, the navy is far superior to what it was before the establishment of the Naval Academy.

To a naval officer a competent knowledge of the principal modern languages—French, Spanish, Italian, and German—is very desirable.

These will enable him to communicate fully on all subjects in almost any part of the world a ship of war may visit.

The knowledge of modern languages is not only a source of amusement, but it is a power, giving force to speech coming direct from the person using it. Ideas conveyed through the medium of a second person oftentimes lose their strength, and the best authors suffer greatly by translation.

There are few officers of the navy who are familiar with either French or Spanish, and most of these have learned the languages prior to entering the Academy. No doubt cadets there lay the groundwork for future advancement, and would acquire a thorough knowledge of the languages taught if during their cruises they paid that close attention to the subject which it merits.

Some persons have greater aptitude for acquiring foreign tongues than others; but close application is often of greater value than a natural aptitude unaccompanied by habits of industry.

In respect to languages foreign officers have the advantage over us, for many of them are conversant with the languages I have mentioned besides the English, which is doubtless to them the most difficult of all.

The case of Elihu Burritt is a notable illustration of what industry will accomplish in the way of learning languages. He mastered Greek, Hebrew, Latin, Arabic, German, French, Danish, Polish, Bohemian, and other tongues while working at his trade as a blacksmith, and published translations from them. After acquiring one or two languages he found the others comparatively easy, and their acquisition became the great happiness of his life.

As a man advances in knowledge his mind is enlarged by a spirit of liberality, and he studies to become useful to his species. Now, although we cannot expect that officers of the navy should equal Elihu Burritt, yet all should be so far advanced in the languages as to be useful to the government and possess those pleasures in literature and science which can be procured in no other way.

In these higher benefits which I propose should emanate from the Naval Academy I do not mean that the institution should be reserved exclusively for any particular branch of the service, but that it should be a college where all grades in the navy may study in their leisure hours, or in a determinate course prescribed by the regulations.

In a profession where officers are thrown so closely together on shipboard, it would be better that *all* rather than a portion should be liberally educated. When the latter is the case, it places one set of officers in a humiliating position, since they could hardly meet their messmates on common ground and discuss understandingly such questions as would tend to the general improvement. The personal intercourse of officers on shipboard could be rendered more satisfactory and

harmonious than it is at present if they had some common object to discuss besides rank.

I often think of the hours I have seen wasted by myself and others on shipboard for want of something substantial as food for the mind, and the vast amount of valuable time consumed in reading trashy novels, which as a rule supply the mental aliment of officers at sea.

How much better would it be if officers while running the trades down in the voyage from the Atlantic to the Pacific, or in crossing the ocean, could unite in the evenings in a discussion of natural sciences, natural history, geography, literature, and the fine arts, or other topics, where each one could take his part. It would be in a measure establishing on shipboard branches of the Naval Institute, which seems to be growing in popular favor, and it would promote harmony, which in some vessels of the navy is decidedly wanting.

I am strongly in favor of the most liberal system of education in the navy that can be devised. The more you educate men who are compelled to live together, the less chance will there be of their disagreeing. As the mind becomes cultivated and refined, the animal instincts, which lead men to dispute and act inconsiderately, are gradually eliminated.

The system of education in a naval or military service had much better be general than exclusive, for where ignorance and knowledge come in contact, the latter is apt to despise the former, and to be cordially hated in its turn. Where knowledge is the rule, harmony will most likely prevail, for men are not likely to quarrel with that which gives them companionship and pleasure and sharpens their understanding.

The philosophy which impels the student at the university to submit to the wholesome discipline of his college will operate in like manner upon the mind of the officer on shipboard to conform to necessary regulations not only for mutual comfort and protection, but also to insure that success in naval operations in peace or war which the government has a right to expect from the officers it educates and supports.

Whatever latitude may be taken with regard to the general advancement of knowledge of all kinds among officers of the navy, I do not propose to encourage some wild ideas that have been broached,—among them one that proposes a combination of all the professional departments of the navy into an office, making what the Spaniards call an *olla podrida*, a dish made up of several articles quite palatable when eaten alone, but not at all savory when mixed up together.

Such chimerical ideas are gaining ground in the navy, but there is not merit enough in the proposition to justify an argument about it and others of a like character.

Construction and steam are two distinct sciences, in either of which,

if a man can reach the highest point of excellence, he will have done quite as much as could be expected from one individual, and a perfect knowledge of either steam or construction would be quite as much as a man could fully comprehend after the study and practice of a lifetime. A person who undertakes both these professions will undoubtedly make a good engineer and a bad constructor of ships, or he will make a good constructor of ships and a bad engineer. The two can only be combined, in very rare instances, where men have peculiar talents for both sciences.

Seamanship and other nautical duties of a line-officer are not so easy to be learned that an officer need desire to encumber himself with a profession he will find it difficult to make himself a perfect master of, though he should by rights be acquainted with its general principles and be able to make himself useful in it in case of necessity.

As a general rule I should prefer to go to sea in a ship that was planned and built by a naval constructor of the most eminent abilities, practically and theoretically, and so esteemed in the opinion of the world at large; one who would be as much wrapped up in his beautiful science as a painter or sculptor would be in their arts.

To such a man I would unhesitatingly defer in planning and building the ships of our navy, while I would look upon a double-headed engineer constructor as an undesirable addition to the service.

I would prefer to have the management of engines, their construction and care, and the charge of that department on board ship under the direction of a competent engineer, who had made the science of steam his study, and who followed it not only as a means of livelihood, but from a pride in his profession.

I would have a ship sailed, navigated, fought, and disciplined by the line-officers, who have been educated and trained for that particular duty.

There is nothing in these different professions that make them antagonistic so that they cannot operate harmoniously together, especially when directed by a common head, the commander of the vessel, who is armed with the power of the law to enforce obedience.

Give all the knowledge you please to an officer, but don't attempt to crowd him with more duties than he can properly accomplish, or he will fail for want of strength to carry him through, and he will likely know but part of the many professions he has attempted to acquire.

I remember once, when I was in Australia, seeing a curious animal called the Platypus. It had the bill of a duck, the head and body of a musk-rat. It had the tail of a beaver and the claws of a badger. It fed upon the land and disported in the water, and it laid eggs, hatched them, and finally suckled its young.

Curious as this animal might be considered, it was not on the whole a success. It could not perform perfectly the functions of any one of

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Curious as this animal might be considered, it was not on the whole a success. It could not perform perfectly the functions of any one of

the animals it partly represented, and I think it became a failure from the fact that it undertook to run too many departments.

This may seem rather an extravagant illustration of what I desire to convey, but it is about as fair a one as I could select for the occasion.

The chimerical ideas which are gradually creeping into the naval service, and bid fair ultimately to overthrow the well-approved and long-established usages which once made our navy, for its size, the best in the world, do not find favor with those who have spent their lives in active service, who are thoroughly acquainted with all the requirements of the navy, and have its interests at heart.

Such notions emanate from individuals who may be said to be hardly out of their chrysalis, who are trying to expand their wings while yet in their caterpillar state, the most mischievous condition in which a butterfly can be placed while undergoing his various transformations.

There are three departments in the navy necessary for its existence, the duties of each being the study of a lifetime.

First and foremost is the art of war, which is of all sciences the most difficult to acquire, for history shows how few men have been pre-eminent in this direction, and how many there have been who, for want of knowledge in this art, have entailed the direst calamities upon their country.

As applied to the navy the art consists in the thorough knowledge of the management of ships either singly or in squadrons and fleets, and the ability to use them against an enemy's ships or fortifications in such a way as to assure victory with the least possible loss of life and material,—to know how to control large numbers of officers and men, and the best methods of shaping into perfect discipline these oftentimes incongruous masses, which may either be a mob or an efficient military force according as they are commanded by a master in the art of war, or by one who has been satisfied to pass without effort through the various grades of the navy, and knows nothing except the mere routine of his profession.

The art of war is not only a most difficult one to master, but it requires constant study to prevent an officer from going behindhand in his profession. It naturally takes precedence over all other sciences connected with a navy, and its primary object is to command with effect the various auxiliary departments.

None are so well fitted to command as those who are educated to obey, and who, under the orders of an intelligent commander, can direct the various departments of a ship in accordance with that commander's wishes. To be one day in command of the deck, next day in command of the engine, and the next serving out provisions and clothing, would be something on the plan of the mermaid,—too much fish to make a decent woman, and too much woman to make a satisfactory fish.

It is as much as any one man can do to master either of the sciences which enter into the composition of the navy, and the only way to harmoniously combine the different departments is to adhere to the system that long experience has proved the correct one, securing to each officer the respect due to his position, but never interfering with the right to command or actual titles, which of necessity belong to the class of officers who are in future to lead our ships to victory, a result they can only attain by a thorough knowledge of the art of war.

While every one who expects to command should understand the *general* principles upon which every department of the service is conducted, it does not follow that a commanding officer should supervise all the details of administration on shipboard. He has subordinates whose business it is to attend to these. A captain cannot manage an engine as well as a machinist, nor can he haul out a weather earring as well as a thoroughbred sailor, for those who have to perform these duties have made them their especial study; but the captain knows how it ought to be done, and has the authority to see it well done.

The commanding officer is the embodiment of the laws and regulations, which are only thoroughly understood by the experience of many years. He has a particular staff to assist in managing and navigating his ship, in fighting her batteries, in expeditions against an enemy, and in maintaining discipline.

This class of officers are the foundation of a navy, without which it could not exist, and can only be established by a long and thorough training in the art of war. All other departments are auxiliaries,—valuable and necessary ones it is true,—but they can only be recognized as secondary, because their duties are confined to one particular department. At the same time they are entitled to every courtesy due to their assimilated rank, and it is very desirable that officers not of the line should have all the benefits to be derived from any enlarged system of education to be conferred upon the navy in the future.

The aspirations which of late years have led officers to encroach upon the long-established customs of the service have been of serious injury to the navy. While kept in check by the firmness of one class and the prudence of the wiser aspirants, no irreparable damage has been done, but when the very officers whose aim it should be to maintain the integrity of the navy, in the organization where it has proved its efficiency, go out of their line to disseminate Utopian ideas disorganizing to the service, they should be required to explain their utterances lest their expressions be turned against themselves hereafter.

There will be no trouble in the navy if each department confines itself to its legitimate business, leaving the responsibilities of command in the hands of those to whom it properly belongs.

A higher education introduced into the service as I have proposed, with an earlier training at sea of the candidates for future naval honors,

would go very far towards making the naval profession a most desirable one.

Under the present able Secretary of the Navy the service has emerged from the dark cloud which hung over it. Let us hope that brighter prospects are in store for us in the future under an organization that will recommend itself to all sensible people.

But if officers of the navy set on foot a plan for the reorganization of the service without the approval of the head of the Navy Department, it would look very much as if the several branches were about to monopolize the duties belonging to the Secretary of the Navy, which would consequently prove that they had not enough to do professionally to keep their minds profitably employed.

All attempts at procuring legislation on naval subjects without authority are wrong, and any step in that direction would lead one to infer that there is a lack of proper discipline in the navy.

DAVID D. PORTER,
Admiral U.S.N.

EDITORIAL NOTES.

We desire to congratulate Paymaster Stevenson and the several other officers of the pay corps of the navy upon their recent advancement a certain number of files in their respective grades for conspicuous gallantry during the civil war,—a reward to which, we are sure, they are fully entitled, although the propriety of conferring it so many years after the acts for which they are thus honored may be seriously questioned by a great many. But, it may be pertinent to inquire, was all the unrewarded conspicuous gallantry of the war confined to the staff and to the pay corps? Were there no surgeons, no engineers, who distinguished themselves in battle or otherwise? Were there no line-officers whose acts of heroism or self-sacrificing devotion to the interests of their country entitled them to promotion, or at least to public applause, but who were permitted to toil on unrewarded and unnoticed? There were many such. We will not make invidious distinctions by giving a score of names which occur to us in this connection, nor ought the government to make such distinctions in singling out a few officers upon whom to confer the tardily-bestowed honor named. If advancements or promotions are to be made for services rendered during the late war, they ought to be made, not as a matter of personal favoritism, but as an act of too-long-delayed justice, and, in this view of the case, the officers of one grade and corps are as much entitled to them as are those of another.

As predicted in the last number of The United Service, the new Ameer of Afghanistan took advantage of his opportunity to make favorable terms with the British, the result being the signing of a definitive treaty of peace, the official announcement of which was made on the 26th of May. As the details of the treaty have been published in all the daily papers, it is unnecessary to repeat or summarize them here. By the terms agreed upon, Premier Disraeli finally obtains his "scientific frontier," which is to protect the Indian tiger from the incursions of the Russian bear, and has thereby added another laurel to the crown which he has lately been wearing in international politics.

Affairs in South Africa are not materially changed, with the exception of the fact that Colonel Pearson, who, with his command, had been so long surrounded in Ekowe by the Zulus, has been relieved by Gen-

eral Lord Chelmsford. No decisive action has yet taken place, but the British forces are slowly pushing their way into the heart of Zululand, receiving the submission of many of the smaller native chiefs. The recent appointment of General Sir Garnet Wolseley to the chief command presages an active and short campaign. There is no officer in the British army better qualified for the peculiar duties of his position than he, as is attested by his brilliant success in the Ashantee war and by his previous services at the scene of the present troubles.

THE recent removal of the War and Navy Departments from their old and dingy quarters to their new and palatial ones in the still unfinished building which is to be their future home, and which, when fully completed, will be the most magnificent structure of the kind in the world, was an event deserving of more than passing attention by all who are interested in the history of our country and the biography of the personages who have combined to make it what it is. If the brick walls of the old Department buildings, which are now to be torn down in order to make room for the completion of the new, could but speak, what a story they could tell of the scenes and incidents which, for over half a century, have made them, next to the Capitol, the most important historical arenas in the United States!—a story of great heroes and little men; of foreign complications and domestic troubles; of patriotism and treason; of impartiality and injustice!

AMONG the articles which will appear in the next number of THE UNITED SERVICE (to be issued September 10) will be the following: "Military Law," by Col. George A. Woodward, U.S.A.; "Selection of Cannon for Future Armaments," by Commodore Edward Simpson, U.S.N.; "North Africa—Proposed Inland Sea," by Lieut. Seton Schroeder, U.S.N.; "The Chesapeake and Shannon," by Rear-Admiral George H. Preble, U.S.N.; "Military Telegraphs," by Capt. H. W. Howgate, U.S.A.; "The Sun's Repulsive Force" (second paper), by Lieut. R. M. G. Brown, U.S.N.; "The Naval Brigade in the Pittsburg Riots" (concluding paper), by Capt. H. C. Cochran, U.S.M.C.; "Naval Education," by Lieut. F. A. Collins, U.S.N.; a chapter from the advance-sheets of the third volume of the Count de Paris's "Civil War in America," by arrangement with Messrs. Porter & Coates, and several other important papers on topics of exceptional interest to the two services.

NOTE.—Several typographical errors appeared in General Wingate's article on "Rifle Practice," published in the last number of the Quarterly, which were due to the fact that the MS. was received too late to permit the proof to be revised by its author.